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Editorial Notes.

The Growth of Our Research.

THERE was a plethora of good things in the papers and reports presented at the annual meeting of The Institution of Gas Engineers; and the more they are studied, the more one sees how many matters require investigation. It perhaps shows our backwardness; but we are certainly on the right way to redress the errors of the past. We have learnt the value of research, and are developing its use. The year has in this respect been constructive in many ways; we have added to the subjects of research, and research has carried us into the by-ways of our work, and has shown that there are promising lands of which we had little knowledge previously. We are hoping that the new Charter and the revision of the by-laws which will enlarge the field of technical culture in membership will have a definite effect upon the character of the Institution papers in the future. We have seen a change coming over the style of the papers since the Leeds University and others of our learned centres have paid more heed to the gas industry's requirements, and since Leeds became linked-up with the technical work of the Institution. And the alteration in the technical education and training of the men of the industry has introduced a good sign in these times, and is highly hopeful for the future. We are convinced with the changes that are pending we shall see this evidence enhanced.

We are not saying this in any petty spirit of criticism of the past. What we all want, what the proposed Charter and the revision of the by-laws show we want, is a much higher standard of work to help us to the broader conditions which we are persuaded the industry needs, and for which it is ripe. The Gas Investigation Committee have been willing. They have done wonderful and enlightening work, and fresh tasks have been heaped upon them again and again; and we have often wondered whether the resources and the expenditure upon the research have been correspondingly increased and the workers correspondingly compensated. We do not think additional remuneration is required to maintain the enthusiasm of the workers. Their hearts are in the work. But we who benefit must not take advantage of that. As an industry with much work to be done, and work which cannot be delayed, we cannot wait. Procrastination means loss. We must rise to the occasion, and let the provision of finance be more than adequate to the demand.

This brings us to another curious point about our industry; and it is that, despite the revelations of our researches, there appears on the surface comparatively little application. Take, for example, the disclosures that have been made regarding the screening of the fines from coal —using the larger in the vertical retorts, and the fines in horizontals. How many works have adopted the practice? More we are afraid have taken no notice of the system than have adopted it. Yet there is money in it from the advantage that accrues. Explanation of the negligence of new knowledge defies us.

Let us return for a minute to the Gas Investigation Committee. We are sorry that the time has arrived for Prof. Arthur Smithells, F.R.S., to relinquish the chairmanship, which he has held with distinction since the inception of the Committee, giving counsel and guidance of inestimable value. Now at the head of the Committee we are to have Mr. Thomas Hardie, M.Inst.C.E., whose combined scientific and practical gas knowledge will keep the work of the Committee in channels which will be of infinite advantage to the industry. We congratulate the Committee on securing his services in that capacity.

Progress in Carbonization.

WHEN joint consideration is given to the paper which Mr. H. Hollings, Chief Gas Chemist to the Gas Light and Coke Company, read at the meeting of The Institution of Gas Engineers, and the Twentieth Report of the Gas Investigation Committee as presented by Dr. Parker, we find a combination of the scientific development of existing work on carbonization and potential new work which promises to be of a profitable nature when the gas industry attains the frame of mind which admits of working-scale experiment. The ordinary sized gas-works has not, of course, the facilities of the Gas Light and Coke Company; but that makes no difference. The paper directs to what may be done and is possible in some circumstances to gain the maximum advantage. Through chemical investigation, we have learned much as to what must be done in carbonization and much as to what it is harmful to do; and the two together make a sum of profit of no mean result. And chemical investigation is constantly enlarging our knowledge of these matters. Although we agree with Mr. Hollings that "our fundamental knowledge of the mechanism of the reactions involved [in carbonization] is very limited," it would ill-become us to be disheartened by the fact. We have done wonderfully well in carbonization, and we are doing well—where practices are up to scientific direction. We are well along the road, and can count achievements which were little expected not so very many years ago. What has been accomplished in vertical and horizontal retort practice is little short of marvellous, as are the advances in the manufacture of carburetted water gas. And yet our knowledge of to-day is but a prelude to the obtaining of improved results with existing apparatus.

Mr. Hollings' paper shows us that this is so. It is a good many years since we learned that in carbonizing in horizontal retorts the old thin light charges were a mistake, and that one of the most important conditions was to place inside such retorts the heaviest possible charge compatible with the heating of the coal and with the necessity of preserving a free path to the ascension pipes. What happened? Improved quantities and qualities of gas and tar, largely through the protection which the heavier charge gave to the evolved products. Now Mr.

Hollings tells us in effect that we have not yet realized the full benefit owing to the loss of gas from the retorts through leakage. A point that many of us have not realized, and yet it is plain when brought to notice, is that, while higher combustion chamber temperatures are employed to carbonize the heavier charge of coal, it is significant that these higher temperatures have less influence upon the degradation of the tar than has the extension of time of heating. But what prospects are there of making improvements without radical departure from present practices? Mr. Hollings' paper indicates the directions in which he is looking. At one of the Gas Light Company's works, they are rapidly reaching the limit of what may be achieved by merely increasing the charge of the coal, and in order to secure any further economies in working there, it will be necessary in the immediate future to study other factors, such as those which are indicated in the paper.

In the first place, Mr. Hollings speaks a little uncertainly as to the yielding of a larger contribution of motor spirit from gas. In this connection he says: "If it were "possible to distinguish in all cases between the several "unsaturated hydrocarbons present and also between the "several paraffins which are normally expressed as "equivalents of methane and hydrogen, it is probable "that many more valuable and interesting deductions "might be made. It is unfortunate that the difficulties "inherent in precise gas analysis present any such dis-"tinction in general work. One method which appears "worthy of further study is to separate the olefines as "their bromine derivatives. Another method is to make "a detailed examination of the spirit which may be ex-"tracted from the gas by means of oil or active char-"coal." Though under investigation, and presenting interest from many points of view, Mr. Hollings issues a caution against considering any proposal for the recovery of motor spirit from vertical retort gas.

Concerning leakages, the analysis of waste gas is of importance for the evidence adduced of the leakage of coal gas into the combustion chambers. It is noticed in connection with waste-heat boilers that at corresponding times there is an increase in the heat content of the waste gases entering the boiler sufficient to cause a temporary rise in the boiler steam pressure. In another part of the paper, Mr. Hollings points out that one of the advantages realized by the provision of the waste-heat boiler is its employment as a means of measuring the volume of waste gas leaving the retort-settings—the general method being that employed in the Twelfth Report of the Gas Investigation Committee. The loss of heat by radiation from the properly insulated shell of a gas tube boiler is so small that it may be neglected for the purpose of this calculation. With a knowledge of the quantity of gas leaving the retort-settings and of the quantity of fuel burned in the producer, it is possible to draw up a carbon, hydrogen, and oxygen balance for the producers and combustion chambers. This provides another method of computing the amount of gas leakage from the retorts. Results are given which show the application of this method to the working of vertical retort installations. It is indeed surprising to learn what such leakage means. Take, for instance, a leakage of 42·1 lbs. of carbon in the form of water gas, whatever its composition it is equivalent to 8·5 therms per ton of coal; a leakage of 3·4 lbs. of hydrogen in the form of coal gas is equivalent to 3·3 therms. Now such facts as these cause one to pause, and to consider whether there is not room here for coal gas reclamation. If the average composition of air-free gas is known with sufficient accuracy, calculation can be made of the approximate thermal equivalent of the coal-gas leakage. The point as to the calculation of the thermal equivalent of the coal-gas leakage and other matters is discussed by Mr. Hollings in a manner which places his paper on a high level of usefulness.

This naturally leads to the consideration of pressure conditions within the retort. Of course, as Mr. Hollings says, the ideal would be to exert a very definite pull upon the retort during the earliest stages of carbonization when gas of the highest quality is being evolved from the coal with the maximum velocity, and to maintain a pressure within the retort equal to, or very slightly in excess of, the gas pressure within the combustion chamber surrounding the retort during the later stages when gas is being evolved at low velocity. How this could be alternatively accomplished is discussed in the paper—(1) By separate governing devices; (2) by sectionizing the hydraulic main and working with sealed dip pipes; or (3) working with a common liquor level in the hydraulic main, and providing for the vertical adjustment of each dip pipe. But by whatever system one works, it is necessary to devise means of effecting adjustment of each separate device as carbonization of the coal proceeds to definite stages in each separate retort. In the first place this adjustment could be made by hand, but eventually the problem of mechanical operation is not beyond the wit of man.

With verticals, one difficulty has been to differentiate between the thermal yields of coal gas and water gas. A method of analysis is put forward by Mr. Hollings in the belief that by its use the difficulty will be partially overcome; and it is submitted in the hope that by its use the path to a still greater thermal economy in vertical retort carbonization may be indicated. In the absence of any such indication, Mr. Hollings says it is difficult to suggest what steps might be taken to improve the efficiency of coal carbonization in any set of circumstances. To facilitate calculations, a nomogram has ben prepared, and is included in the paper; and this will be found most useful, as an illustration of its use testifies.

Ammonia recovery, fractional condensation, and points associated with the manufacture of carburetted water gas are also discussed by Mr. Hollings. Much current chemical work has been avoided by him, and only illustration has been given which it is hoped will prove of more immediate practical interest to the gas maker. Nevertheless, the paper is of high standard; and in this reference to it we have sought to do nothing more than to emphasize what we conceive to be the central features of a communication of more than ordinary value.

Potential Lines of Development.

TAKING the Twentieth Report of the Gas Investigation Committee as suitably following Mr. Hollings' contribution—the one dealing with the chemical developments of carbonization, the other with possibilities—it is found that, busy as the Committee have been, they have succeeded in advancing another stage in determining the influence of the grading of the coal charge in different sizes, of the admixture of the different sizes, of working at different temperatures, the effects of the addition of coke breeze to the charge and the results of the addition of calcium carbonate, iron oxide, and sodium carbonate. That is a fairly big programme; but in the advance of carbonization there is not a single item which is not indispensable. Looking at the preliminary notes of the Committee on the work that has been done during the year, it is clear they are quite justified in the claim they make as to the work accomplished; and we cannot refrain from quoting their words with the view of emphasizing the point. The work of carbonization has been carried on from normal temperatures to 344° C., at which carbonization changes had only just begun, and no coking had occurred. The claim made (we know of nothing to dislodge it) is that the series represents perhaps the most complete survey ever made of the effects of carbonization at different temperatures on the quantity and quality of the gas, coke, tar, and liquor. Among the other points stressed in the preliminary observations is that by use of higher temperatures, and therefore a greater temperature head, carbonization is not only carried through with a higher gas production, but is accomplished, much more quickly; and this emphasizes what was pointed out last year, that much greater outputs are likely to be obtained by a process of incomplete carbonization using a high-temperature head than by a process of low-temperature carbonization. Another point is that the characteristics of cokes produced under different conditions of working are of increasing interest to the gas industry. It is proposed to publish at a later date a special report dealing with their reactivities and ignition temperatures. There will be interest in the data.

Let us try to extract the salient lessons from the report as they point to our potential carbonization developments.

In the first place, as to the size of coal in relation to temperature. Carbonizing several sizes of coal ranging from 1¼ in. to ¾ in. down to 8 to 30 mesh, separately and in combination, at five different temperatures—ranging from 980° C. to 630° C.—we derive the lesson that with the retort at any temperature below 820° C., the total yield of coke, tar, liquor, and gas was not greatly affected by alterations in the grading of the coal. When carbonization was carried out at higher temperatures—980° C. and 915° C.—the total volumes and thermal values of the gas made were lower with the largest grade of coal (1¼ in. and ¾ in.), and the yields of tar were greater with the smaller grades. It must not be forgotten that this finding is with the special experimental horizontal retort, and that the same conditions do not apply as when the larger coal is used in vertical retorts and the fines in horizontal retorts. As a matter of fact, the Committee themselves make the point that considerable economies may result from the screening of coal for gas production; the fines being separately carbonized. The economics of low-temperature carbonization receive a bad shock when the obvious is pointed out—that the time required for carbonization rises rapidly as the temperature of the retort is lowered, which means that financially—initially and operating—the ratio of carbonization costs to volume of material treated must rise considerably as we proceed down the scale in temperature.

Another point that is promising is the mixing of inorganic compounds with coal. It looks as though this only holds good at the higher carbonization temperatures at which experiment was made, so that it must not be considered that such mixture is beneficial in all circumstances. We get this emphasized in the one passage: "The "calorific values in B.Th.U. per c.ft. of the gas made "from the blends with sodium carbonate, 72 lbs. of car- "bonate per ton of coal, were lower than from the coal "alone; but the volumes and calorific values in therms "per ton of coal were appreciably increased at all tem- "peratures of carbonization above 600°." The improvement in gas volume ranged between 9 p.ct. and 24 p.ct., and in therms between 3 and 12 p.ct. The rates of gas production at all stages of carbonization with the retort at 915° C. and 815° C. were greater with the mixture containing sodium carbonate than from the coal without addition. With the retort at 725° C. and 630° C., however, sodium carbonate had little effect on gas production during the earlier stages of carbonization. The addition of calcium carbonate, and with the retort at 915° C., caused an increase of 11 p.ct. in the volume of gas made per ton of coal, and an increase in total therms of 5 p.ct. The rates of gas production were greater at all stages than with coal alone. At 815° C. or at lower temperatures, the yields of gas and tar were approximately the same with or without calcium carbonate. The point as to sulphuretted hydrogen being reduced is interesting, as is also the information that the cokes made with the different sizes of coal, carbonized at 915° C. and 815° C., were similar in appearance and strength to the corresponding cokes made at 980° C. Below 800° C. the cokes became less robust. Our low-temperature friends must not look for any assistance from the admixture of inorganic compounds with their coal.

Towards the end of the report information is given regarding ignition temperatures and reactivities towards steam and carbon dioxide. Lowering the temperatures of carbonization from 980° C. to 915° C. caused increases in the reactivities towards steam and carbon dioxide, but had no effect on ignition temperature. The cokes obtained by the carbonization at 915° C. of mixtures of coal with calcium carbonate, iron oxide, and sodium carbonate were more reactive towards steam and carbon dioxide, and were more easily ignited than coke from coal without addition. Then it is seen that calcium carbonate, iron oxide, and sodium carbonate increased the reactivity towards steam in ascending order as named; but as regards the effects on ignition temperature and reactivity towards carbon dioxide, iron oxide was less powerful than calcium carbonate.

This information in one form or another was published last week; but it is referred to again as it furnishes signs regarding the directions of future carbonizing developments.

Scotch Cannel and Oil Production.

OF low-temperature carbonization oil-making systems there seems to be no end. Another was advertised last week—a German process, built according to plan by Mr. Aicher, which is stated to have been in successful operation in Germany for the last three years. Mr. Aicher has good credentials. He was formerly of the well-known engineering firm of Messrs. Thyssen & Co., of Mulheim, Ruhr. We are particularly interested in this system for two reasons. First, it is described as a "true low-temperature carbonization process;" and, secondly, the plant in Germany uses Scotch cannel coals because they are richer in oils, gas, and coke than German steam coals. Of course, they would naturally be richer in oils and gas. The British Empire rights in the Aicher process are stated to have been acquired by the Franco-British Oil Trust, who, it is reported, have also acquired a well-known Scottish colliery at which plant for the working of the process is to be installed at once. The colliery in question is stated to have upwards of 40 million tons of cannel coal actually in sight, together with a complete plant and equipment for the production of 400 tons of coal daily. Now many years ago it was due to Scotch cannels that the illuminating value of Scotch gas was kept up to a very high point, and, in fact, was objectionable for use in bunsen burners. But many of our Scotch friends stuck to it; high illuminating power being more or less a tradition in the gas industry of Scotland. Science, however, gained the day; and Scotland is no more a high illuminating value gas country. There was another thing which produced the downward movement, and that was the shrinkage of the supply of the cannels and their consequent dearness. Thus we are left pondering over the commercial side of Mr. Aicher's method of producing oil from cannels which at one time were scarce in quantity and high in price—which conditions cannot have been altered.

Forty Years After.

One would not willingly, if invited to participate in it, miss the annual co-partnership festival at the Crystal Palace of the South Metropolitan Gas Company; for it is invariably stimulating and pleasure-giving. This year's gathering, which took place on Saturday last, and a report of which appears in the news columns of to-day's issue, was no exception to the rule. It was a happy day throughout; but the most pleasant feature of all was to see in his accustomed place, and evidently in greatly improved health, Dr. Charles Carpenter, the revered President of the Company, and one of the staunchest supporters of the co-partnership principle. It is a function which he certainly would not willingly miss; for he has been with co-partnership since its early days in the industry. In his address on Saturday, Dr. Carpenter made reference to the difficulties encountered in those early days, and to the progress that has since been made, until to-day something like fifty gas undertakings throughout the land are working under principles similar to those put forward by the South Metropolitan Gas Company in 1889, while these same principles have spread to many other industries up and down the country, where they have been adopted more or less completely in nearly three hundred instances.

The Weyman Fund.

Progress is being made with the fund which is being raised by those who had interest in, or instruction from, the work of the late Geoffrey Weyman, to provide primarily for the education of his children; the total amount so far subscribed amounting to £763 15s. 6d. The lengthy list of subscribers includes gas companies, members of the Society of British Gas Industries, many gas engineers, consulting engineers, gas chemists, and those concerned in the coke oven industry. It is felt, however, that there are still many who would wish to subscribe to the fund, but who, for one reason or another, have not yet done so. It is for their benefit that we give this reminder that subscriptions should be sent to Mr. T. F. E. Rhead, Central Laboratory, Gas-Works, Nechells, Birmingham. The Institute of Chemistry have offered to co-operate whole-heartedly

with the Committee who have the matter in hand; and substantial assistance is expected from that body.

Mr. A. G. Glasgow on British Trade Unions.

Our old friend Mr. A. G. Glasgow, of Messrs. Humphreys & Glasgow, who is so well known to British gas engineers, has had conferred upon him the honorary degree of Doctor of Engineering by the Stevens Institute of Technology. In his address on the occasion, Mr. Glasgow had something to say on the economic theories and policies of British trade unions. In America, he said, trade unionism was sufficiently enlightened to appreciate and share the benefits of scientific management, standardization, and mass production. In Great Britain, trade unionism was organized to suppress the right to work and enforce the right to strike. It seemed absolutely incredible to Americans that the antiquated and discredited fallacy, long since exploded by mass production, that production meant unemployment, that men must be paid to loaf perpetually rather than work efficiently, should still remain the keynote of the British trade unions. If, he added, the trade unions wished to survive, they must henceforth encourage production by every means in their power; and no great success could be achieved without recognizing that standardization and mass production formed industrial America's great current of contribution to national and world culture.

The Fourth Electricity Scheme.

The electricity scheme for North-West England and North Wales, under the Electricity (Supply) Act, 1926, details of which have been received by the Central Electricity Board from the Electricity Commissioners, is the fourth which the Commissioners have made and transmitted to the Board. The total area involved embraces 9082 square miles, comprising 4982 square miles in the whole of Lancashire, Westmorland, and Cumberland up to the Scottish Border in the North, and 4100 square miles which are under the control of the North Wales Power Company.

Important Industrial Areas.

The district coming within this scheme includes four large industrial areas—South-East Lancashire, Mersey and West Lancashire, Mid-Lancashire, and the great shipbuilding yards in Barrow-in-Furness and the blast furnaces ranged round the Cumberland coast. The most important in volume of output is the first-named—South-East Lancashire—section, where re-organization is already, largely through the co-operation of the Manchester Corporation and the Lancashire Power Company, practically complete; power being supplied by a number of highly efficient stations. In the Mersey and West Lancashire district and the Mid-Lancashire area, similar conditions obtain. The result of these developments is that, out of a total of 70 generating stations in the area owned by 122 authorized undertakers, 27 have been selected for permanent operation under the scheme, and 6 for temporary operation; while the North Wales Power Company will have the right to add its two water power plants to the list of selected stations. Thus only 35 stations will be closed-down.

Some Big Figures.

Estimates are that by 1940-41 the total capacity of all plant, allowing for withdrawals, will be 1,991,125 KW.; so that the new one will be second in importance only to South-East England. It is calculated that the total output of electricity by March, 1935, will be 3,638,000,000 units, rising to 5,813,000,000 units by March, 1941. By that time, it is added, the output per head of population will have risen to 686 units. The total revenue from all electricity supplied in North-West England and North Wales is now slightly in excess of £8,000,000, at an average price of 1·34d. per unit. The estimate is that, under the national scheme, this average will in a few years' time be less than 1d.

Export Coal and the Five Counties Scheme.

Strong criticism of the Five Counties Coal Scheme comes from Mr. William Straker, the Secretary to the Northumberland Miners' Association. He says the Secretary for Mines seems to think the scheme was only to meet the competition of foreigners, and did not in any way come into competition with Northumberland and Durham. Regarding Northumberland, where in normal times about 80 p.ct. of all coal sold has to meet all competitors in the foreign market, the Secretary for Mines fails to grasp the real effect of the Five Counties Scheme. The subsidized coal under the scheme is being sold at a reduction of 4s. per ton—thus making it impossible for Northumberland to secure a price for export coal which will enable the industry in this county to live. Before the scheme began to operate, Northumberland was recovering some of its foreign trade; but, owing to the subsidized coal, it is being cut out.

The British Industries Fair.

The latest information shows that the Industries Fair for next year is going to be on a grander scale than ever. The additional building which is to be provided at the White City will give 100,000 sq. ft. of stand space, in addition to the 250,000 sq. ft. of stand space at the last fair—roughly 40 p.ct. increase. In Birmingham, the increase of space will bring the exhibition area to about 250,000 sq. ft.—making the total area for both sections of the fair about 600,000 sq. ft. That is a striking advance, testifying popularity and success.

Road Costs.

When the Joint Parliamentary Committee who are considering the Railway Companies Transport Bills met last Wednesday, the Hon. E. E. Charteris, K.C., stated that while in 1913-14 the cost of road maintenance to local authorities was upwards of £18,000,000, in 1924-25 it had risen to £51,000,000. To reconstruct a road to-day in order to make it suitable for motor traffic cost no less than £12,000 a mile.

OBITUARY.

J. STEWART DOUGALL.

It was with very great regret that we learned of the death, on Wednesday, June 20, of Mr. J. Stewart Dougall, who had held the position of Engineer and Manager of the Boston (Lincs.) Gas Light and Coke Company for no less than 38 years. The writer of this note had the pleasure of a conversation with Mr. Dougall at the reception by the Lord Mayor of The Institution of Gas Engineers in Cardiff, exactly one week prior to his passing away, and he appeared then to be in his usual health and good spirits. He was, however, taken ill early on the following Monday, removed to the Boston Hospital in the evening, and underwent a serious operation the same night—the end coming two days later.

Mr. Dougall will be greatly missed by many gas engineering friends, particularly in the Midlands, as well as by all connected with the undertaking of which he had for so long a period been in charge, and for the development of which to its present dimensions he was largely responsible. When he took charge of the works in 1889, the annual sale of gas was 40 million c.ft. to about 2000 consumers; while the figures for 1924 (the year preceding the Company's centenary), the figures were 125 million c.ft. and 5660 respectively. Deceased, who was in his 68th year, was a brother of Mr. James Dougall, of the Chiswick Meter and Engineering Works.

A Large Bye-Product Coking Scheme.

A Company has been formed under the title of "British Benzol and Coal Distillation, Ltd.," with a capital of £250,000, to instal a Becker coke oven plant in accordance with a specification prepared by the Woodall-Duckham Vertical Retort and Oven Construction Company (1920), Ltd., together with a benzole rectification plant and a tar distillation plant, on a site leased from the Bedwas Navigation Colliery Company (1921), Ltd., at Bedwas, South Wales. The Becker coke ovens which are to be installed are a post-war development, and are similar to those which are at the present time carbonizing over 20 million tons of coal per annum in different parts of the world. The new Company has entered into an agreement with the Bedwas Colliery Company for a supply of approximately 750 tons of coal per day at 11s. per ton at the Colliery, for a period of fifteen years from the time the plant is completely installed and ready for operation. Arrangements are being made for the plant to be in full work in 1929. The Directors of the Company are: Major-Gen. Sir Neill Malcolm, K.C.B., D.S.O. (Chairman), Sir Arthur Duckham, K.C.B., M.Inst.C.E., Mr. Gordon Ralph Hall Caine, C.B.E., M.P., Sir Samuel Instone, and Col. Herbert Charles Woodcock, J.P., D.L., M.P. This new scheme will give employment to a large number of men in South Wales during the construction of the works, and subsequently on the operation of the plant and at the Colliery. The low operating costs of this type of plant ensure the production of coke at a favourable price. The plant will produce approximately 500,000 gallons per year of motor spirit and nearly 1,000,000 gallons per annum of other oils.

PERSONAL.

FORTHCOMING RETIREMENT OF MR. P. S. HOYTE.

At the annual meeting of the Plymouth and Stonehouse Gas Light and Coke Company, it was intimated by the Chairman (Mr. J. H. Ellis) that Mr. P. S. Hoyte, the Company's Chief Engineer, would retire from his present position towards the end of the year. Mr. Hoyte's association with the Plymouth Gas Company has been a long and interesting one.

Educated at the Nottingham High School under the late Dr. James Gow (who afterwards became the famous Head Master of Westminster School), Mr. Hoyte received his professional training under the late Mr. W. R. Chester, M.Inst.C.E., Chief Engineer to the Nottingham Corporation Gas Department, and subsequently under the late Mr. John West, M.Inst.C.E., Consulting Engineer to the Plymouth and Stonehouse Gas Company. Appointed Assistant Engineer to the Company in 1895, Mr. Hoyte became Chief Engineer and Manager in 1900. During his association with the Company, the yearly output of gas has risen from 627 million c.ft. to 1800 millions. In order to meet this ever-increasing demand, Mr. Hoyte has been responsible for the re-modelling of the manufacturing and distribution systems, with the result that to-day the Plymouth and Stonehouse Gas Company possess an undertaking, the equipment of which leaves little to be desired.

This modernization scheme included the provision of an extensive telpherage system serving the entire works area, the erection of a 4 million c.ft. per day Glover-West vertical retort installation, and the recasting and enlargement of the whole of the works mains. It also included the erection of an electrical generating station of considerable capacity, and an exceptionally wide application of electrical power to the driving of the various units of works plant. Over a hundred electric motors are in use at Coxside; and it is not too much to say that very few British gas undertakings (relative to their output) make so widespread a use of this form of power. It may be of interest, in this connection, to mention that over 750,000 Board of Trade units are produced annually in the Company's private station. Another noteworthy feature of the re-modelled plant is the new booster, valve, and meter house, with its comprehensive system of distant pressure indication and remote governor control apparatus. Such work carried out over a period of years necessarily implies heavy expenditure; but it is a significant fact that during the whole of the time these extensive schemes have been in progress the gas sold by the Plymouth Company has enjoyed the distinction of being among the cheapest in the country, to the mutual benefit of both consumers and shareholders. In 1916 Mr. Hoyte was largely responsible for inaugurating the first scheme in this country for the co-operative handling of the tar produced by gas-works in Devon and Cornwall—a system which has since spread to the greater part of the country.

Mr. Hoyte is a Member both of The Institution of Gas Engineers and of the Institution of Mechanical Engineers, and was elected a Member of Council of the former Institution in 1921. In 1923 he became President of the Southern Association of Gas Engineers and Managers. His year of office was marked by a memorable meeting in Plymouth.

He has been responsible for the extension of the Company's supply into the districts of Plymstock, Oreston, Turnchapel, Billacombe, Elburton, Honicknowle, and Crownhill; while in 1921 the undertaking of the Plympton Gas Company was acquired, the existing works at Plympton shut down, and that district supplied by high-pressure mains direct from the works at Coxside. The quality of the work carried out on the manufacturing side of the plant is reflected in the far-seeing provision made for the future supply to the rapidly growing rural districts served by the Company's high-pressure mains. During the war years Mr. Hoyte held the position of Superintendent for the Ministry of Munitions in the South-West of England, in connection with the extraction of benzole and toluole from coal gas for the manufacture of high explosives.

The services of Mr. Hoyte, who is one of the largest shareholders in the Company, have been retained as Consulting Engineer; and the position which he vacates will be filled by Mr. R. J. H. Clark, who, in the capacity of Chief Assistant Engineer, has been closely associated with Mr. Hoyte for many years in the development of the undertaking.

MR. R. J. MILBOURNE.

The recently elected Chairman of the Council of the Society of British Gas Industries, Mr. R. J. Milbourne, last Thursday at the Grosvenor Hotel entertained to luncheon some thirty members of the Council and guests. The function was pleasantly informal, but talk was largely of the heavier part which the Society intend to take in the affairs of the gas industry. The guests of honour were Mr. John Terrace, President of The Institution of Gas Engineers, and Col. Williamson, Chairman of Messrs. C. & W. Walker, Ltd. Their names were coupled with the toast of the visitors, which was proposed by Sir Arthur Duckham, K.C.B., who said they all looked upon Mr. Terrace as an ideal Gas Engineer. Sir Arthur also mentioned the present ambitions of the Society. Mr. Terrace, in his reply, pointed out that the idea of applying for a charter for The Institution of Gas Engineers had really emanated from their deliberations as to the possibility of widening the doors into the Institution. He hoped that, when this widening had been achieved, many whose usefulness they sought would step forward. Col. Williamson, in his reply, paid a high tribute to the qualities of Mr. Milbourne. Mr. C. A. Goodall proposed the health of "The Chairman," congratulating him upon his election and wishing him a very successful year of office; and Mr. Milbourne's reply, in which he foreshadowed a busy time for himself and the whole Council, closed a delightful interlude in the day's work.

Dr. HAROLD G. COLMAN has removed his offices from Arundel Street, Strand, W.C. 2, and his address is now Sentinel House, Southampton Row, London, W.C. 1.

Mr. R. J. H. CLARK, who is to succeed Mr. P. S. Hoyte, whose impending retirement was announced at the annual meeting of the Plymouth and Stonehouse Gas Light and Coke Company, as Engineer of the Company, was born and educated in London. After six months' training at the Exeter Technical School in the engineering branch connected with Messrs. Willey & Co., he went to Plymouth early in 1903, and served for four years as articled pupil under Mr. Hoyte. He also studied at Plymouth Technical School, and passed the City and Guilds examinations in Gas Manufacture, first-class, with honours, and Gas Supply, with honours. After nearly two years as Second Assistant, he was appointed, in December, 1908, Chief Assistant Engineer to the Company, and has now served the undertaking for over 25 years. During this period he has been intimately associated with the very extensive re-modelling schemes initiated; and the output of gas has practically doubled in the period of his service. He is a member of The Institution of Gas Engineers and of the Western Junior Gas Association.

Mr. JAMES RILEY, eldest son of Mr. A. H. Riley, Manager of the Rossendale Union Gas Company, has been married at Waterfoot to Miss Constance Wint, of Rawtenstall.

FORTHCOMING ENGAGEMENTS.

[*Secretaries of Gas and Kindred Organizations are asked to assist in making this diary of events as complete and useful as possible by sending the earliest intimation of all meetings.*]

June 29.—WAVERLEY ASSOCIATION OF GAS MANAGERS.—Annual meeting in the Chambers Institute, High Street, Peebles. Presidential Address of Mr. George Urquhart (Tranent). 11 a.m.

July 4-5.—ASSOCIATION OF STATUTORY INSPECTORS OF GAS METERS.—Annual conference in Birmingham.

July 9-12.—ASSOCIATION OF PUBLIC LIGHTING ENGINEERS.—Annual meeting and conference in Sheffield.

Aug. 14-15.—IRISH ASSOCIATION OF GAS MANAGERS.—Annual conference in Belfast.

Oct. 22-24.—BRITISH COMMERCIAL GAS ASSOCIATION.—Annual Conference at York.

THE INSTITUTION OF GAS ENGINEERS.

All meetings take place in the Council Room at 28, Grosvenor Gardens, unless otherwise stated.

July 10.—Gas Education Committee.

July 16.—Emergency and Finance Committees and Benevolent Fund Committee of Management in the morning; Royal Charter Committee meeting and Council meeting in the afternoon.

Sept. 10.—Emergency and Finance Committees and Benevolent Fund Committee of Management in the morning; Council meeting in the afternoon.

Oct. 8.—Emergency and Finance Committees in the morning; Council meeting in the afternoon.

Oct. 9.—Gas Education Committee.

Nov. 12.—Emergency and Finance Committees in the morning; Council meeting in the afternoon.

Nov. 13.—Executive Committee of Gas Education Committee.

Dec. 10.—Emergency and Finance Committees in the morning; Council meeting in the afternoon.

Dec. 11.—Executive Committee of Gas Education Committee.

ELECTRICITY SUPPLY MEMORANDA.

Lukewarm Support.

We have a great deal of sympathy with the lines of the Presidential Address to the Municipal Electrical Association of Mr. Fredk. W. Purse, Engineer and Manager of the West Ham Electricity Department—not because of our interest in gas supply, but because of practical considerations which should always dominate the views of the engineer in whatever sphere he practises. In the prefatory part of his deliverance, Mr. Purse bemoaned the inadequacy of the £24,000 per annum which is the sum of the principally voluntary subscriptions by which the work of the British Electrical and Allied Industries Research Association is carried on. He described it as "meagre" and "inadequate," and the expressions are fitting. He also commended the aims and objects of the National Register of Electrical Contractors as being such as to command a greater amount of support from supply engineers than they receive at present. Here it is moral, not financial, support that is necessary; and he cannot think that those who stand aloof can do so because they are indifferent to the standard of installation work connected to their mains. Mr. Purse urges that support and encouragement should be given to registered contractors in every way.

The New Act.

It was when Mr. Purse dealt with the new Act that he was at his best. However much one may be on the other side of the roadway in connection with the provision of electricity supply, it is difficult to see that the material advantages that are going to issue from this scheme are in the greater number of electrical stations going to compensate for the main disadvantages. It is true that before and during the passage of the Bill through Parliament there was a considerable amount of window dressing and Press propaganda which made claims which went to such absurd length as to discount their value to those who were in a position to judge of their value. "Marvellous figures," says Mr. Purse, "were quoted as to the saving or reduction which the Act would effect, when, as a matter of fact, as subsequent experience is proving, at least 75 p.ct. of the amount could have been effected without the Act, and it remains to be seen whether the further 25 p.ct. will justify the cost of effecting it." Then, again, great play was made of the fact that there are a large number of small generating stations that are redundant and ought to be scrapped; but Mr. Purse is quite certain that the 500 engineers, with all their skill and ability, each striving his utmost to lower the cost of production, have done more in the past to bring about a full supply of low-priced electricity for all who require it than will the very limited number be able to achieve in the future. In the great scheme there has been much dreaming of dreams. This is what Mr. Purse maintains: "With the wholesale reduction in the number of generating stations and their personnel thrown on the scrapheap, with true comparisons between the remaining stations obliterated by inter-running, the element of competition will disappear, the individual will lose his individuality, size will take the place of skill, and thermal efficiency will take the place of 'dollar' efficiency." He submits that high thermal efficiency and low coal consumption can be attained by anyone, but at a cost. Generation can be concentrated at a few stations, and the energy transmitted all over the country, but at a cost. The only guarantee is that for a period of not less than seven years the cost per unit is to be less than that for which it was previously produced—only for a period of seven years is the cost guaranteed, and the super-cheap units that were spoken of as being ours for the asking are still concealed in Acts of Parliament. The main feature of the scheme is for the interconnection of practically all the undertakings of the country, for the supersession of a large percentage of existing generating stations, and for what is now termed the base stations being carried on by a few of the largest stations. Mr. Purse can see that these stations, already in a favourable position, will be still more favoured at the expense of the smaller and less fortunately placed stations. Another criticism is that the rate relief of 1½ p.ct. in Schedule 5 is being regarded as an obligatory contribution to the rates instead of a permissive one. The view of the Association is that there should be no contribution to the rates except in repayment of amounts previously contributed from the rates. He urged that the Central Electricity Board should not be led too much to rely upon the grid for the transference of the load—"the gain by the reduction of spare plant is not as great as we are asked to believe; interconnection is only between the alternators, and as there is a great deal of other plant not interconnected, their value cannot be taken into consideration." And finally a careful examination of the schemes so far published by the Central Electricity Board shows that their success and financial stability depend on a large, and continuous, increase in the units sold. Therefore, it is upon the undertakings themselves that the sale of units and the success of the scheme will depend, but the supply must be delivered to them on such terms and conditions as will enable them to get the business.

An Echo of the General Strike.

An echo of the general strike has been heard in the Law Courts. Messrs. G. Scammell and Nephew, Ltd., brought an action against nine members of the Stepney Borough Council for conspiracy with the Electrical Trade Union to cut-off their supply of electricity during the strike. The allegation was denied, and defendants pleaded that they had acted in accordance with their duties as councillors. The drift of the case of the plaintiffs was (as presented by Sir Walter Greaves-Lord, K.C.) that defendants agreed not to continue the supply because they did not desire plaintiffs' business to go on. "If a man allows his political sympathies to interfere with the carrying-out of his duty," said Counsel, "that is no excuse before the law for doing that which is illegal." The Town Clerk of Stepney submitted that all the defendants had sympathies with the Labour Party. In his view serious rioting would have occurred if outside men had been called in for the power station. Mr. Justice Avory said he proposed to leave to the jury the question of whether the defendants in doing what they did were acting *bona fide* in the execution of their duty or whether they were acting from some improper and indirect motive—such as the furtherance of a general strike. In summing-up, Mr. Justice Avory said he did not hesitate to express the opinion that all those people who organized the general strike were guilty of at least a criminal conspiracy, if not of something more serious. Any person who assisted or furthered the interest of those who organized and promoted a general strike was doing something illegal; and the jury would have to decide whether the defendants acted in their honest belief that they were carrying out their statutory duty, or whether they were actuated by any indirect motive to injure the plaintiffs, or to further the interests of the strikers. If they were really actuated by the desire to further the interests of the strikers, they would not in his opinion be protected by the provisions of the Public Authorities Protection Act. In the view of the jury, the defendants were not acting in good faith in the honest belief that they were carrying out their statutory duties; but they were actuated by an indirect motive to injure the plaintiffs, and to further the interests of those taking part in the general strike. Thus it was his Lordship entered judgment for the plaintiffs for the agreed damages of £350, with costs. But a stay of execution was granted, with a view to an appeal. In the circumstances no comment is made.

Mishaps.

For forty minutes Dundee was without an electricity supply on the afternoon of June 7. Believed to be due to the fusing of an electric wire, serious damage was caused by a fire which broke out at the printing works of Mr. W. D. Bell, of Stafford, on the 10th inst. A defective flex caused the death by electrocution of Cyril Alfred Farnsworth (aged 33), of Staple Hill. In the course of his duties he had to go into a cellar lighted by a lamp at the end of a flex about 10 ft. in length. On the day of the accident, he was found lying on his back in the cellar grasping the bulb (which was not giving light) in his left hand. The voltage was 210. An assistant from the Bristol Electricity Department said great care should always be used in employing electricity in a damp cellar. The verdict was death from shock caused by a defect in the flex. On June 17, while painting a pole which carries electric wires from Bullcross Colliery to Markham Main Colliery, Doncaster, Oscar Barbar, a labourer, was electrocuted. When at the top of the pole he inadvertently caught hold of a wire, and was thrown to the ground.

Electricity in U.S.A.

The United States Geological Survey reports that for 1927 an output of 80,205,474,000 KW.-H. was the record of the public utility power plants. Of this total the output from water-power plants amounted to 29,875,008,000 KW.-H., or 37·2 p.ct.; the remainder, 50,330,466,000 KW.H., being produced from fuel. These figures apply to all public utility power plants of 100 KW. and over, including electric light and power, railways, reclamation service, and certain manufacturing plants selling energy for public utility purposes. The fuel consumption consisted of 41,888,000 tons of coal, 6,782,000 barrels of fuel oil, and 62,919,000,000 c.ft. of natural gas. This is equivalent to 45,910,000 net tons of coal, from which 49,995,000,000 KW.-H. were generated at an average fuel consumption of 1·84 lbs. of coal per KW.-H. For the small remainder wood fuel was used, more than two-thirds of it in Oregon. In 1919 the average consumption of coal was 3·2 lbs. per KW.-H., and in 1926 the figure was 1·95 lbs.

Domestic Hot Water.—No. 171 of "A Thousand-and-One Uses for Gas," published by the British Commercial Gas Association, is a photographic and descriptive record of the many ways in which hot water can be obtained economically and with little labour in the smallest flat, the bungalow, the cottage, and the mansion.

THE INSTITUTION OF GAS ENGINEERS AT MONMOUTH.

Outside the Rolls Hall during the Excursion, an account of which appeared on pp. 840-41 of the "JOURNAL" for June 20.

THE INSTITUTION OF GAS ENGINEERS.

Council Meeting at Cardiff.

A Meeting of the Council of The Institution of Gas Engineers was held at the Park Hotel, Cardiff, on Monday evening, June 11, when there were present: Mr. H. D. Madden, M.Inst.C.E. (President), in the chair; Messrs. John Terrace and C. S. Shapley (Vice-Presidents); Messrs. C. Rhodes Armitage, Harold E. Copp, L. J. Langford, W. E. Caton, H. C. Smith, Thos. Carmichael, R. E. Gibson, R. Robertson, and W. J. Smith, B.Sc. (Ordinary Members of Council); Messrs. Fras. C. Briggs (Midland Association) and H. H. Gracie (North British Association); Mr. Chas. F. Botley and Mr. J. Ferguson Bell (Past-Presidents); Mr. W. E. Price (Hon. Secretary) and Mr. Walter T. Dunn (Secretary).

The minutes of the previous meeting having been confirmed and signed, expressions of regret at absence were received from Mr. W. H. Bennett, Mr. J. Herbert Canning, O.B.E., and Mr. Philip G. G. Moon (Ordinary Members of Council); Messrs. Frank Prentice (Eastern Counties Association), W. Millar (Irish Association), Herbert Lees (North of England Association), T. Hardie (Southern Association), and A. T. Kyle (Wales and Monmouthshire District Institution).

A letter was read from Dr. Charles Carpenter with reference to the Nineteenth Report of the Gas Investigation Committee, and directions were given for a suitable reply to be addressed to him. It was also reported that Dr. Carpenter had written to express his regret that in consequence of indisposition he was prevented from attending the Cardiff meeting.

It was reported from the Midland Association of Gas Engineers and Managers that Mr. W. G. S. Cranmer, of Willenhall Gas-Works, Shortheath, near Wolverhampton, had been elected to represent that Association on the Council of the Institution for the year 1928-29.

A letter was reported from the Czecho-Slovakian Association of Gas and Water Engineers acknowledging the Institution's invitation to attend the Cardiff meeting of the Institution, and explaining that in consequence of the Institution meeting taking place on the same day as that of the French Association it was impossible to send a representative to Cardiff. It was unanimously resolved that the President of the Czecho-Slovakian Association be elected to Honorary Membership of the Institution at the meeting opening on the following day.

Mr. A. F. P. Hayman, of Antwerp, was appointed to represent the Institution at the meeting of the Association Technique de l'Industrie du Gaz en France, which was opening on the following day. It was reported from the Deutscher Verein von Gas und Wasserfachmannern that they also could not send a representative to the Institution's Cardiff meeting, as their meeting was to take place on the same day.

The Norwegian Gas Association had sent an invitation to the Institution to be represented at its annual meeting taking place in Bergen from Aug. 25 to 27, and to attend an exhibition to be held in connection therewith, in which exhibits of domestic industry would be included. It was decided to nominate Mr. J. C. Irminger, of Bergen, to represent the Institution.

The acknowledgment from the Lord Mayor of London of the receipt of 50 guineas to his fund for the relief of Miners' Wives and Families was reported.

A letter was read from Mr. R. J. Rogers, of Birmingham, Hon. Secretary of the Gas Industry Section of the British Industries Fair, 1929, to take place in Birmingham, in which the Council was asked to consider the arrangement of a Research Conference. The matter was deferred to the ensuing meeting of the Council in London.

A cablegram was reported from Mr. A. G. Glasgow, who was now on a visit to New York, expressing his gratitude for a letter addressed to him from the Institution congratulating him on the award of the Walton Clark Medal of the Franklin Institute "for his outstanding and valuable work in technology and development of the manufactured gas industry." This Medal was presented to Mr. Glasgow in person on May 16 at the Annual Medal Day meeting of the Institute; Mr. Glasgow's sponsor being Mr. F. R. Wadleigh, of New York.

It was reported that a telegram conveying the Institution's congratulations to His Majesty the King on the occasion of his birthday had been dispatched, and that a gracious acknowledgment had been received.

A letter from the British Engineering Standards Association was reported in which it was stated that in the Charter for which they are now applying there would be included a Gas Industry Sectional Committee.

The Report of the Conference on Coke Development which took place on May 21—Mr. C. S. Shapley in the chair—was presented and adopted. The following resolution was passed at the conference:

> That a Sub-Committee be formed to go into the question, and prepare a scheme for having agents in the Commercial Sections of each District Association for the disposal of surplus coke.

A communication was reported from the Carnegie Institute of Technology, Pittsburgh, relating to the arrangements for the Conference of Fuel Technologists of eleven different countries. The representative of the Institution appointed by the Council was Dr. E. W. Smith, and the date of the conference is during the week commencing Nov. 19 next.

The Report of the Gas for Therapeutical Purposes Committee, prepared by Dr. E. W. Smith, its Chairman, was presented, accepted, and adopted for laying before the members at the meeting of the Institution opening on the following day.

The receipt of a letter dated June 8 from Prof. John W. Cobb on the subject of research organization was reported and referred to the Emergency Committee for consideration.

Mr. Shrimpton, the Institution's Solicitor, attended to report the result of the advertisement which had appeared in the "London Gazette," inviting those who desired to oppose the granting of the Royal Charter to the Institution to lodge their reasons by Monday, June 11, the day on which the Council meeting was being held.

It was arranged that Mr. Shrimpton should be present on the following morning in order to answer any legal questions that might be put forward by members of the Institution.

The Secretary reported the final arrangements that had been made for the conduct of the annual meeting; and it was decided that a wreath from the President, Council, and Members of the Institution should be placed on the Welsh National War Memorial, which was to be unveiled by H.R.H. the Prince of Wales (Honorary Life Member of the Institution) on the following day.

It was also reported that the Chairman and Directors of the Cardiff Gas Light and Coke Company had kindly invited the Council and other friends to dinner that evening at the Park Hotel.

The reception of delegates from kindred Associations in the Dominions and abroad, and of members home on leave, was arranged.

NEW TULLY PLANT AT PORTHCAWL.

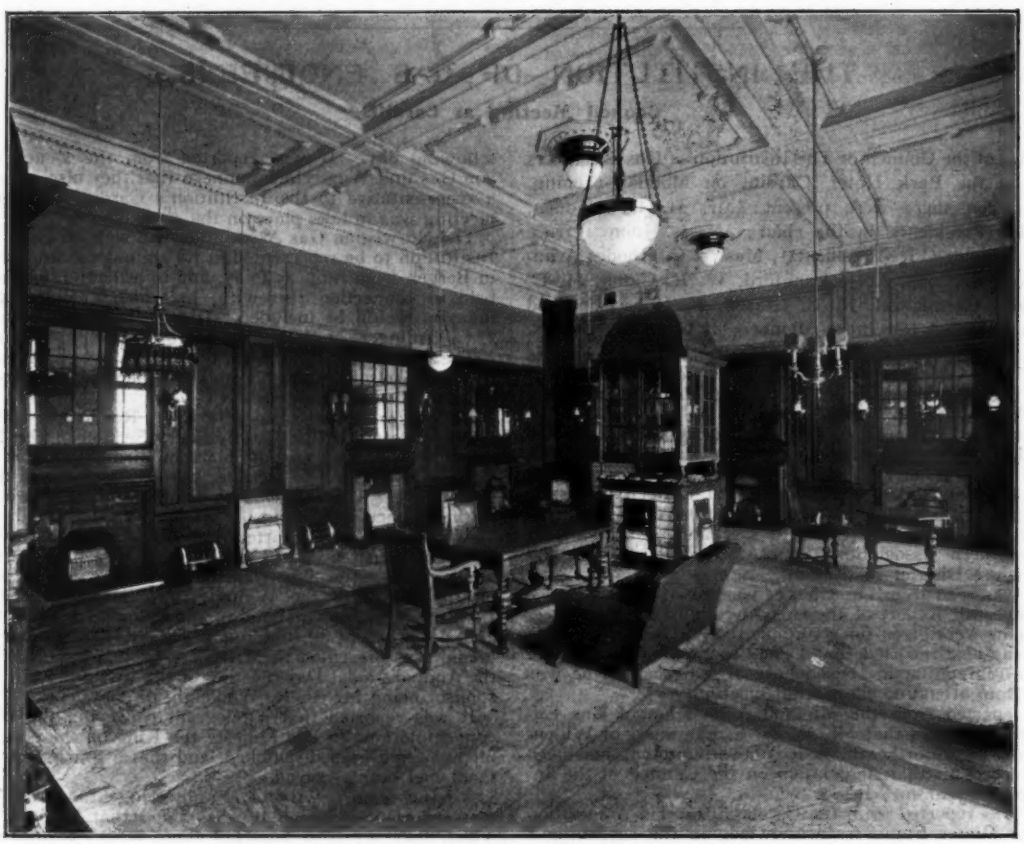
An interesting and significant little ceremony took place at Porthcawl on Friday, June 15, when Councillor W. J. Griffen was asked by the Chairman of the Gas Committee to open the new Tully plant which has been erected at the gas-works of the Council in the commendable time of three weeks. Councillor Griffen said he appreciated the honour very much, and looked upon the plant as assisting to solve the many difficulties they had to encounter at the works. He believed that the expenditure they had incurred in the installation of the new plant would prove very profitable. Mr. Tully, jun., the contractor, explained to those present the operation of the plant; and a demonstration of its working was given by him.

Afterwards the party assembled at the Seabank Hotel, where dinner was served on the invitation of the Gas Committee of the Porthcawl Urban District Council, with Councillor Mabley in the chair. In welcoming the company, he said that he trusted the important steps which had been taken by the Council on the recommendation of the Committee would result in what they all desired—a reduced price of gas.

The principal post-prandial speakers were Councillors W. J. Griffen, D. Parry Evans, and C. Bragg. "The Visitors," proposed by Councillor Evans, was responded to by Mr. Walter T. Dunn and Mr. Arthur Ellis, the Council's Electrical Engineer. In proposing "The Gas Undertaking of Porthcawl," Councillor Griffen outlined its history since it was purchased from the Porthcawl Gas Company, on the recommendation of, and at a price suggested by, Mr. J. Ferguson Bell, Past-President of The Institution of Gas Engineers. Mr. S. Walker, Engineer of the Works, responded. A vote of thanks to the indefatigable and genial Chairman was carried by acclamation.

The toasts were interspersed with musical items ably rendered by Miss David, Mr. Morgan David, and Mr. D. M. Parry Evans.

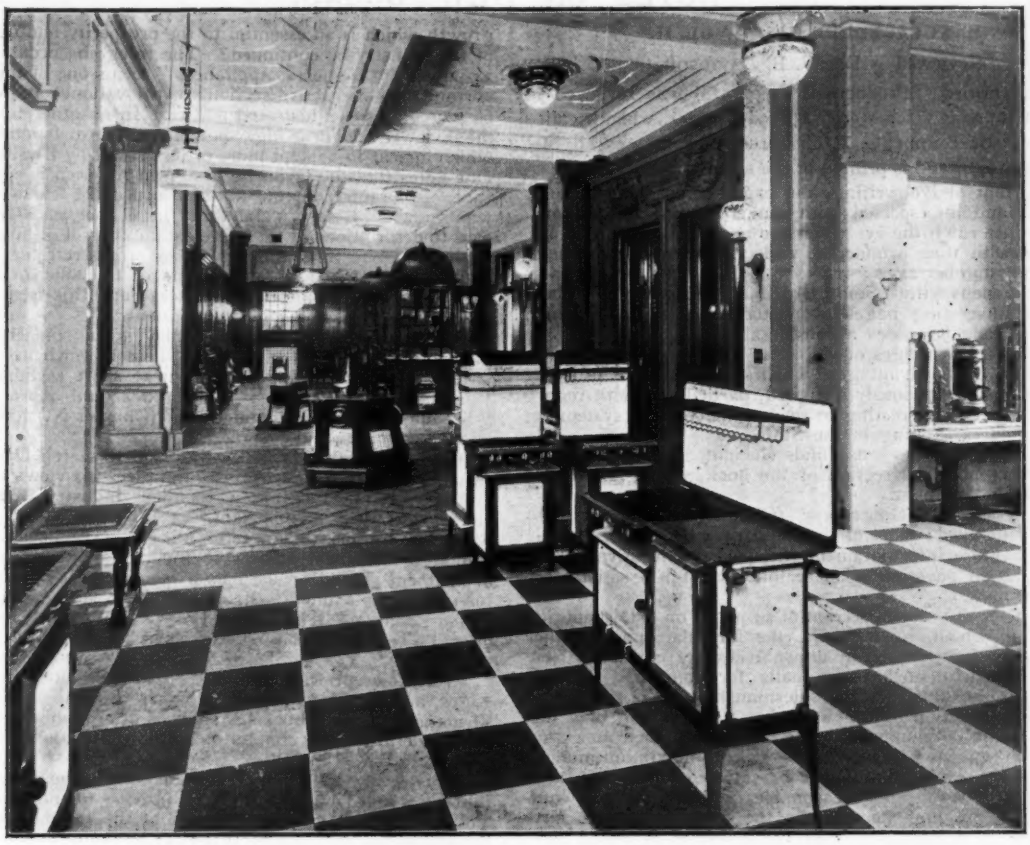
THE REORGANIZED SHOWROOMS OF THE LIVERPOOL GAS COMPANY.



A GAS FIRE DISPLAY TO THE RIGHT OF THE ENTRANCE.

Considerable alterations were recently carried out in the Duke Street Showrooms of the Liverpool Gas Company by the Nautilus Company, of Luton. A new entrance vestibule was made between the two sections of the showrooms, necessitating the pulling down of the existing walls and the fixing of stanchions and girders. By this means what were previously two showrooms were made in effect into one; and a large number of exhibits can now be seen at a glance by persons coming into the rental department at the back of the premises. Before the alterations, to reach the rental department one went through the vestibule, from which there was no view of the showrooms.

On the left of the entrance is the cooker and hot water ap-



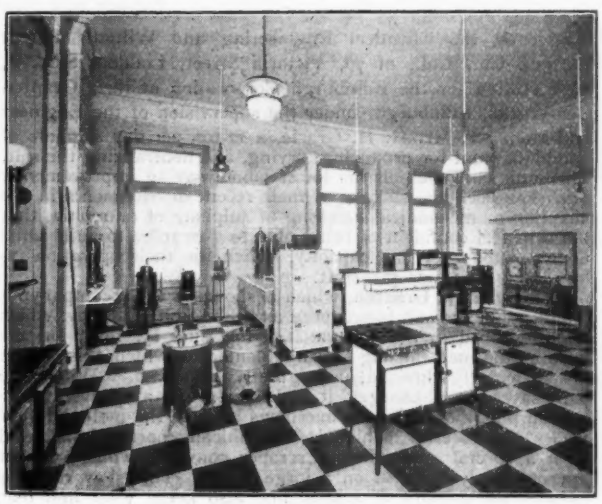
COOKER AND HOT-WATER DEMONSTRATION.

pliance showroom, with geysers and similar appliances working for demonstration purposes in one corner. This latter has been formed by a large screen built up in coke breeze blocks. An existing fireplace and flue were altered so that a tiled

The Vestibule.

kitchen fireplace could be formed to show gas cooking and heating apparatus. The walls have been covered with varnished tile paper of special pattern. All the woodwork has been painted French grey, except that of the geyser and hot water section, which has been treated with white glazed tiles. The floor has been covered with rubber, marble pattern.

On the right of the entrance is the showroom for gas fires. Fireplace openings for five live fires have been made; the flue being built up of " Nautilus Economy " flue blocks. With the addition of another fire, which was left undisturbed from the old arrangement, there are thus six live fire settings. The walls have been panelled in Austrian oak, 10 ft. 6 in. high, with bolection moulded jambs to fireplaces. These have over them



Effective Floor Treatment.

mirrors which are divided up into small squares with moulded glazing bars. The style of the panelling and sections of the mouldings is similar to that of the Queen Anne period. The floor has been covered with rubber panelled out to represent marble.

In the vestibule two live gas fires have been placed, the openings having bolection moulded jambs and tile interiors with hearths and antique bronze curbs; the flues being connected up to existing ventilating shafts.

NOTES ON NEW BOOKS.

"MANUFACTURED GAS."—VOL. II.*

Reviewed by Dr. W. B. DAVIDSON.

Vol. I., entitled "Production" (pp. 518) was reviewed in the "GAS JOURNAL" for March 23, 1927, p. 744, when it called forth eulogistic comments. The present volume is slightly smaller (pp. 447), and is printed in the same unusual but attractive style, that of typewriting, the pages being large (10½ in. by 8½ in.) and interspersed with numerous fine illustrations. These at once catch the eye when the book is opened, and impress one with their wonderful variety, clearness, and neatness. They number 225.

The book opens with "Storage of Gas" (Chapter I.). There are eight interesting pages on waterless holders, of which America already possesses a considerable number. There are nine classified advantages of waterless holders, but there is no classification of disadvantages—which, however, are probably not so serious as previously supposed, particularly with regard to leakage. It is interesting to read of the various systems of pressure holders existing in the States.

"Mains and Services" one finds elucidated in Chapter II.—an important practical section of the book, calling, however, for no special comment.

"Compressors and Governors" (Chapter III.) appear to be sufficiently detailed; most of the appliances being distinctively American. More information might, perhaps, be given about types of station governor. There follows a fairly satisfactory chapter on meters.

Following a very useful section of 24 pages on "Distribution Design," in which, by the way, the formulæ appear rather clumsy as typewritten, is an unusual chapter entitled "New Business Department," which calls for remark. This is nothing more nor less than gas salesmanship. It is stated that "the proper function of a new business department of a gas company is the development of the business to such an extent and on such lines as will enable it to sell the maximum amount of gas to the maximum number of satisfied customers, at a price that will result in a reasonable profit to the gas company." The growing sternness in the competition with electric service is pointed out, and the question is asked (and methods are given for obtaining a satisfactory answer), Will growth which is so essential to the prosperity and development of the industry be continued? The foregoing occupies another 24 pages. "Domestic Appliances" forms one of the most important and instructive sections of the volume, and consists of 66 pages of well illustrated matter. In no other textbook has the reviewer seen drawings showing the construction of geysers, which appear to be kept more or less secret by English makers. One notes that the favourite design in America is copper coiled tube, as against narrow annular concentric chambers in the well-known "Ewart" and other familiar types. Attention is paid to descriptions of the thermostatic control of house heating appliances, and three different types of gas refrigerator are described. Little is said about tests of the efficiency, hygienic and thermal, of domestic appliances; and this is, perhaps, an unfortunate omission.

"General Industrial Applications" is the subject of another important chapter of 51 pages. There is much useful and instructive matter in this and the next short section on "Gas Furnace Design," both of a theoretical and a practical kind. "Selection of an Industrial Fuel" (Chapter X.) has chiefly to do with furnaces and costing.

In expatiating on the "Testing and Research Department" (Chapter XI.), Prof. Morgan summarizes his views as follows: (1) The gas business is a chemical industry. (2) Routine chemical testing is important. (3) The results of laboratory work are for use and not for filing. (4) The chief chemist should be technical adviser to the management; and (5) his department should be used as a training school and reservoir for technically trained men. (6) More research is necessary.

Short chapters (XII. and XIII.) come next on "Safety, Accident Prevention, and First Aid" and "Accounting and Statistics."

"Principles of Rate Making" (Chapter XIV.) takes up 38 pages, and includes sections on "Rate Fundamentals," "Rate Structure," "Rate Forms," analysis of accounts, and the like.

A moderately long chapter on "Public Relations" brings the treatise to a close.

In his review of Vol. I. ("Production"), the reviewer stated that he would look forward with interest to the publication of Vol. II. After his cursory perusal of the volume recently published, he can only say his hopes of becoming acquainted with a high-class, up-to-date volume on gas supply have been fully realized. He wishes to compliment the author on the very successful accomplishment of a formidable task—that of supplying the gas industry with a complete and superior treatise on gas manufacture and gas supply.

* "Manufactured Gas," by Jerome J. Morgan, M.S., Ph.D., Associate Professor of Chemical Engineering, Columbia University. In two volumes. Vol. I., "Production," pp. 518; Vol. II., "Distribution," &c.; published by Jerome J. Morgan, Broadway, at 119th Street, New York, 1926 and 1928.

SULPHATE OF AMMONIA PLANT AT THE GRANTON GAS-WORKS, EDINBURGH.

New Process of the Chemical Engineering and Wilton's Patent Furnace Company, Ltd., for Drying and Neutralizing the Salt.

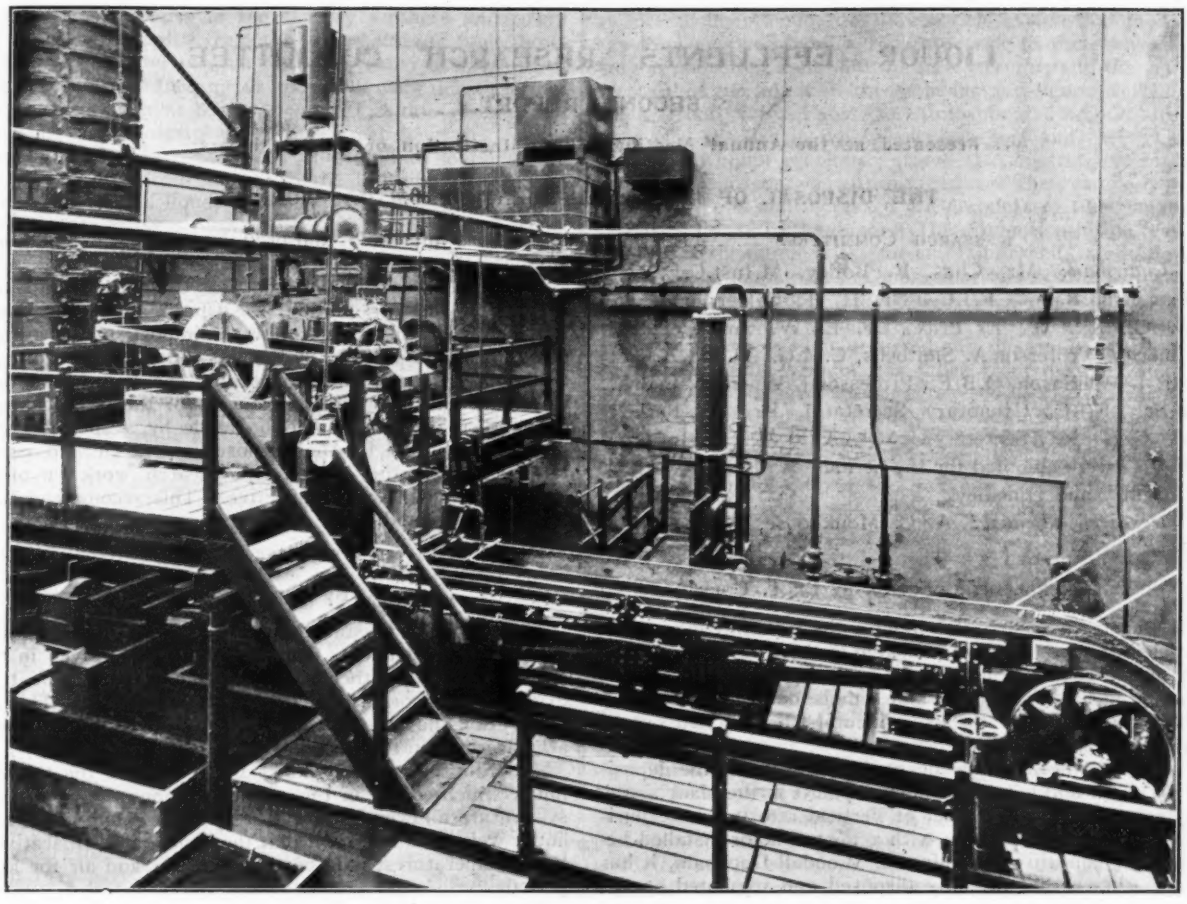
Recently the Chemical Engineering and Wilton's Patent Furnace Co., Ltd., of 76, Victoria Street, London, S.W. 1, have erected for the Edinburgh Corporation at their Granton Gas-Works, Edinburgh, under the supervision of the Engineer and Manager, Mr. H. H. Gracie, a 12-ton per day sulphate of ammonia plant for producing, drying, and neutralizing the salt. This unit embodies all the latest labour-saving improvements. Such has been the success of their recent developments in the direction of mechanical handling of sulphate of ammonia, that the firm feel confident of being able to guarantee to build units up to 40 tons per day capacity, which for their operation require only two men per shift.

In the plant at Granton, which is shown in the accompanying photograph, the salt is produced as in the unit at Derby, which was described in the "JOURNAL" for June 15, 1927, but the drying and neutralizing arrangements, to which this article is particularly directed, are greatly improved. When the salt leaves the discharger, it is delivered into a receiver where any surplus mother liquor overflows back to the mother liquor well. The receiver, which is mechanically operated, is fitted with a special acid-resisting scraper conveyor which runs at approximately 3 R.P.M. on a large wheel. This slow running reduces the amount of splash, and also keeps wear and tear down to a minimum. The speed of the scraper conveyor can be regulated to deliver the exact quantity of sulphate from the draining table on to a moving conveyor belt described later. The whole of the materials used, wherever possible, are acid-resisting. The conveyor belt is made of a metal resistant to both alkali and acid. It is pliable, and is arranged to travel over drums situated at each end of the conveyor, which are approximately 16 ft. between the centres. The belt is kept in tension by automatic tensioning gear complete with adjustable plummer blocks, so that perfect running and tension of the belt can be obtained. As the belt passes forward, and after it has discharged the salt, it runs through a water bath at the bottom of the conveyor, thereby ensuring that the belt is thoroughly clean and in perfect condition to receive the fresh sulphate at the end of each complete circuit. This arrangement reduces water washing to a minimum.

Situated under the belt are a number of vacuum shoes made of acid-resisting material. Each shoe is connected to a common main through an anti-priming tower, where the mother liquor and acid from the sulphate are separated from the air, and whence they drain back to the mother liquor tank. The free air passes to an exhauster which creates a vacuum on the whole apparatus. The sulphate is delivered on to the belt by the self-feeding receiver, which is so fed that the salt drops on to the conveyor in the form of a cake about 3½ in. to 4 in. thick, or thicker, as may be desired, according to the output of the plant to which the arrangement is fitted.

The first vacuum shoes draw out any surplus mother liquor and surface acid. Between the first and second vacuum shoes, neutralizing is effected either by adding weak ammonia liquor (about 1½ p.ct. strength) in the form of a spray or rain, or by adding ammonia gas, or by adding ammonium carbonate or soda ash, with a special feeding device. The three remaining vacuum shoes effectively remove the surplus moisture from the neutral salt, so that the amount is not more than 7 p.ct. In actual working, it varies between 5½ and 6 p.ct. The salt travels along the belt at the rate of 24 in. to 28 in. per minute. This slow motion, involving as it does the whole of the machinery on the sulphate plant, reduces wear and tear on the complete plant to a minimum.

The sulphate travelling along the conveyor drier is delivered into the final drier in a continuous stream, where it is converted into dry neutral salt, granular in form, by being lifted with shovels fitted on the outside of a rotating nest of tubes. These shovels gradually convey the sulphate from the wet end to the dry end of the machine, and shower it over the tubes, thus bringing it into contact with heated surfaces a large number of times before it is delivered from the machine. When



THE NEW SULPHATE OF AMMONIA PLANT AT THE GRANTON GAS-WORKS.

thoroughly dried, the salt leaves the machine through a perforated plate, which prevents any lumps being formed. At this point the salt will not contain more than about 0·1 p.ct. of moisture, and is finally automatically bagged and weighed.

From the foregoing description it will be seen that the salt is mechanically handled from the time it is manufactured till the time it emerges from the drier. This results in considerable saving, and thereby increases the amount of profit made per ton of salt produced. With automatic and adjustable machinery for handling the salt, it requires only supervision to see that the machinery is running perfectly; for once the machines are regulated, there is no reason why any variation should be necessary.

Definite figures regarding the power and steam consumption of the plant demonstrate the savings effected. Further improvements in regard to the recovery of pyridine by bubbling the neutralizing gases through acid will be embodied in a unit which the Chemical Engineering and Wilton's Patent Furnace Company are at present erecting. A further development will be the drying of the salt by passing hot air over the band during the passage of the sulphate from one end of the belt to the other. Tests at Granton showed that, while the sulphate on the band at the beginning of its travel was at a temperature of 92° C., after it had passed the first suction shoe the temperature had fallen to 52° C. It is felt that if the former temperature were maintained by allowing hot air to travel through, instead of cold air, the emission of the moisture from the salt would be much greater. Improvements in the conveyor belt have also been made, to minimize replacements and wear and tear.

Murdoch's Burial Place.

An esteemed friend from Japan, when on a visit last week to the "JOURNAL" office, was desirous of knowing the burial place of Murdoch. A vast amount of information with regard to Murdoch is to be found in Mr. Charles Hunt's "History of the Introduction of Gas Lighting," which was published by us a good many years ago now. For the writing of this book, Mr. George Tangye placed at Mr. Hunt's disposal his collection of Murdoch papers and drawings, which were preserved by Mr. Tangye at the winding-up of the once famous establishment of Boulton & Watt. Mr. Hunt states that Murdoch died on Nov. 15, 1839, aged 85 years, at Sycamore Hill House, Handsworth. He was interred in Handsworth Churchyard, near the remains of Boulton and of Watt; and a bust of him by Chantry (of which an engraving appears in the book) was placed within the church to perpetuate his memory. There is also, in the informative little book on "The Discoverer of Gas Lighting," written by Mr. Walter T. Layton (and published from the "JOURNAL" office in 1926), a footnote naming Murdoch's burial place.

Liquefied Gas for Domestic Use.

The sale of liquefied petroleum gas for heating purposes in territory where natural gas is not obtainable is, we learn from the "Gas Age-Record," being undertaken by the Skelly Oil Company. "Skelgas," as it is called, will consist largely of propane, which is to be prepared at Oklahoma and Texas gasoline plants. It will be sold in 20-gallon high-pressure drums; and it is calculated that each drum will contain enough liquid to furnish gas for a single burner for about 375 hours. The liquefied gas contained in the cylinders will exert a pressure of about 30 lbs. per sq. in. at zero Fahr., and hence will completely vaporize as pressure is released at all ordinary temperatures. The gas will work in any burner designed for natural gas. It is claimed by the Company that "Skelgas" will contain about 2700 B.Th.U. per cubic foot of vapour. For the present, "Skelgas" will be bottled at the gasoline plants where it is produced. Later it is the plan of the Company to build distributing points to which the liquefied gas can be shipped in tank cars and bottled, to cut-down freight costs.

Department of Scientific and Industrial Research.—In connection with the Physical and Chemical Survey of the National Coal Resources, which is one of the important aspects of the fuel research work of the Department of Scientific and Industrial Research, the Department have recently appointed a Committee to deal with the South Wales Coalfield with the following constitution: Messrs. A. G. Brown, D. F. Davies, R. Gibb (Junr.) and W. D. Woolley (representing the Monmouthshire and South Wales Coal Owners' Association); Mr. W. O'Connor (representing the South Wales Institute of Engineers); Dr. T. Robertson (representing the Geographical Survey of Great Britain); Dr. C. H. Lander and Dr. F. S. Sinnatt (representing the Department of Scientific and Industrial Research).

LIQUOR EFFLUENTS RESEARCH COMMITTEE.

SECOND REPORT.

Presented at the Annual Meeting of The Institution of Gas Engineers.

THE DISPOSAL OF LIQUOR EFFLUENTS FROM GAS-WORKS.

RESEARCH COMMITTEE.

Chairman: Mr. Chas. F. Botley, M.Inst.C.E., Dr. T. Lewis Bailey, F.I.C., Dr. H. T. Calvert, M.B.E., F.I.C., Mr. W. E. Price, Dr. E. W. Smith, F.I.C., Emeritus Professor A. Smithells, C.M.G., D.Sc., F.R.S., Mr. J. Wilkinson, O.B.E., Professor J. W. Cobb, C.B.E., B.Sc., F.I.C. (Honorary Secretary), Dr. A. Parker, F.I.C. (Deputy Secretary). Messrs. P. N. Langford and F. Lee were co-opted for the periods of research work at Coventry and Hinckley.

Research Chemist: A. C. Monkhouse, Ph.D., B.Sc., A.I.C.

GENERAL INTRODUCTION BY PROF. COBB.

During the past twelve months the Committee has continued its work on lines indicated in the First Report, and a second report is now issued with a preceding summary prepared by Dr. Parker, and a more detailed account by Dr. Monkhouse of the experimental work carried out at Hinckley and Coventry.

This has been mainly devoted to a study of the deposition of tar and liquor at different points in the plant as the gas proceeded from a set of vertical retorts to the purifiers. By experimenting with a tar extractor installed before the condensers by Messrs. Woodall-Duckham, it has been shown that properly disposed and regulated sprays can be made effective in hastening the precipitation and separation of tar and higher tar acids, and that a material lessening of the thiocyanate and thiosulphate content can be brought about at a later stage of the cooling by taking suitable precautions—all tending to the production of a less harmful effluent.

It is proposed to try out an electrostatic process for a more rapid separation of the tar fog than can be expected from spraying, and a generous offer from Messrs. Lodge-Cottrell to instal their apparatus for this purpose has been accepted. Mr. F. Lee and his Committee at Hinckley will house it and add to the obligations under which they have already placed this Committee, and which it is here desired to acknowledge. The results obtained should be of value and interest to the gas industry, not only as regards effluents, but in other respects.

Dr. Monkhouse, with the co-operation of Mr. Lee and his assistant, Mr. J. Grayston, has been mainly occupied with the experimental inquiry into the conditions of deposition and separation of tar and liquor in the plant as influencing the proportions of harmful constituents in the effluent, but he has also been able to continue his work on the small-scale bacterial purification of the effluent at this works and to indicate its possibilities. In addition, through the courtesy of Mr. Langford, Gas Engineer of Coventry, and with the co-operation of Mr. Aveline, the Chemical Plant Superintendent, he has been able to make useful observations and tests on the working of large-scale bacterial purification on the newly-installed Coventry beds, dealing with a mixture of gas-works effluent and sewage.

A number of inquiries has been addressed to the Committee from gas engineers in different parts of the country respecting their difficulties with effluents. Some of these could be answered by a reference to Dr. Parker's contribution to the First Report, entitled "Disposal of Liquor Effluents from Gas-Works." In other cases, more than this was plainly required. In dealing with them the Committee has been guided by the consideration that although it has not the function of working out detailed schemes, or the resources for that purpose, it can give service in general terms and examine any features specially relevant to its work. This has been done mainly by Dr. Parker and Dr. Monkhouse, who have paid visits, conferred with the persons interested, and brought away for examination any necessary samples.

During the year the National Gas Council, through the Institution and Mr. Botley, the Chairman of this Committee, raised for consideration the important and urgent question of the position of the gas industry in regard to ammonia production and disposal. The recommendation was made that a preliminary survey of the technical and commercial position should be made by a special Committee constituted for the purpose, with a view to ascertaining how further action by research work or other methods could be made effective. This recommendation has been accepted.

SUMMARY.

By A. PARKER.

An account of existing knowedge of the subject of disposal of liquor effluents from gas-works was given in the First Report, together with a preliminary statement of experimental work which had been commenced. The investigations have been continued, and the results obtained are described in this second report.

According to usual practice in gas-works, the tar and liquor which collect in the various sections of the cooling system are allowed to flow direct into a common tar and liquor well, with the result that the liquor, at comparatively high temperatures, is in contact with tar and air for long periods.

The principal obnoxious constituents of ammonia liquor are higher tar acids, monohydric phenols, thiocyanate, and thiosulphate. When ammonia liquor is distilled the obnoxious constituents are afterwards found in the spent liquor from the still and in the devil liquor.

From the work described in the reports of the Chief Inspector of Alkali Works, it was concluded that the proportion of higher tar acids in the liquor could be reduced by the removal of the heavier tar at a temperature above the dew point of the gas before condensation of liquor commenced; and the tar and liquor should be stored separately.

In the first instance, determinations were made of the volumes of tar and liquor deposited at different points of the cooling system of the installation at the Gas-Works, Hinckley, where the carbonization units consist of Woodall-Duckham continuous vertical retorts. The gas from the retorts enters air-cooled condensers at about 140° Fahr. and then travels through a water-cooled condenser, an exhauster, two Livesey washers, and two tower scrubbers to oxide purifiers. Air for purification is admitted at the inlet of the exhauster. According to usual practice at Hinckley, the tar and liquor from the different points run into a common tar and liquor well, from which the liquor is pumped periodically to a liquor storage tank. From the tar and liquor well, which is usually at a temperature of about 120° Fahr., liquor is pumped through sprays situated in the gas collecting main in the retort house. Liquor from the liquor storage tank is employed in the Livesey washers, and is circulated through the first tower scrubber. The second tower scrubber is flushed occasionally with water.

The total amount of tar (dry) collected per ton of coal carbonized in the experiments was 17·2 gallons, of which 4·7 gallons was deposited from the hot gas in the mains in the retort house, 7 gallons between the retort house and air-cooled condensers, and the major portion of the remainder in the condensers. The total volume of liquor obtained was about 32 gallons per ton of coal. A mixture of the liquors as condensed in different sections of the plant (Table VI.) gave a total oxygen absorbed value of 950 parts per 100,000, of which approximately 240 parts were due to higher tar acids, &c., 600 parts to monohydric phenols, 75 to thiocyanate, and 50 parts to thiosulphate.

The liquor after use in the Livesey washers and tower scrubber, as sampled from the liquor storage tank, however, gave a total oxygen absorbed value of 1642 parts per 100,000, of which about 300 parts were due to higher tar acids and similar bodies, 650 parts to thiocyanate, and 160 parts to thiosulphate. The great increases in the amounts of thiocyanate and thiosulphate undoubtedly largely resulted from the use in the Livesey washers and tower scrubber of liquor previously stored in contact with air at comparatively high temperatures, and thereby rendered more active for cyanide removal.

Higher Tar Acids, &c.—A tar extractor, designed by Messrs. Woodall-Duckham for experimental purposes, was then installed in the hot foul gas main in the retort house. The tar extractor consists essentially of a restricted gas main supplied with sprays of liquor and followed by an expansion chamber from which deposited tar and liquor are removed. The hot tar and liquor from the gas collecting main and the extractor are separated immediately and the liquor, rich in fixed ammonia, is recirculated to the sprays in the collecting main and the extractor. A number of experiments was conducted with different types and sizes of sprays to which liquor was supplied at different pressures from 15 lbs. to 50 lbs. per sq. in.; and the volumes of tar and liquor and the compositions of the liquors deposited at various points of the cooling system under the several conditions were determined. Under the best conditions obtained, the volume of tar deposited in the retort house was increased from 4·7 to 11·6 gallons per ton of coal, but at the same time some liquor was separated from the gas. The installation of the tar extractor reduced the quantity of higher tar acids, &c., in the mixture of the liquors condensed at different points, from the equivalent of approximately 240 parts of oxygen absorbed to 150 parts per 100,000. The oxygen absorbed value of the liquor deposited in the mains between the retort house and the air-cooled condensers was reduced from 1312 parts to 1072 parts per 100,000, the difference being accounted for almost entirely by a diminution in higher tar acids, &c., from an equivalent of 541 parts of oxygen absorbed to 321 parts per 100,000. Experiments are now in progress in which the liquor supplied to the sprays in the tar extractor and gas collecting main is heated by closed steam coil, with the object of preventing the deposition of liquor from the gas as it travels through the extractor and preceding mains, and minimizing contact of liquor and tar.

The experiments have shown that the composition of ammonia liquor, as regards content of higher tar acids and similar bodies, can be improved by the deposition of heavy tar before condensation of liquor occurs. Further improvement is anticipated if a larger proportion of tar could be deposited from the hot gas. Tar and liquor deposited in each section of the cooling system should also be separated from one another as rapidly as possible.

Experiments with the tar extractor already installed are being continued, and arrangements have been made for the erection of a Lodge-Cottrell electrostatic tar precipitator in the hot foul gas main of a new installation of Woodall-Duckham vertical retorts to be put into operation at Hinckley during the next few months.

Thiocyanate and Thiosulphate.—It has not been possible at Hinckley to determine the influence of reducing the oxygen content of the gas to the minimum, since the carbonization retorts have been in operation over four years, but it is hoped to carry out experiments on this factor with the new installation. The influence of oxygen in the gas, however, is indicated by analyses of samples of liquor from a works where the gas at about 140° Fahr. enters two sets of condensers in parallel and air is admitted at the inlet to one set. The thiocyanate and thiosulphate contents of the liquor from the condensers not supplied with air were equivalent to 100 parts of oxygen absorbed per 100,000, but the liquor from the condensers to which air was admitted contained amounts of thiocyanate and thiosulphate equivalent to over 700 parts of oxygen absorbed per 100,000. It is clear, therefore, that air for purification should be admitted at the inlet to the purifiers, after condensation and removal of liquor, if the quantities of thiocyanate and thiosulphate in the liquor are to be kept to the minimum.

Since the installation of the tar extractor at Hinckley, as already mentioned, hot liquor rich in fixed ammonia has been supplied from a separate tank to the sprays in the gas collecting main and the tar extractor, and the temperature of the liquor in the main tar and liquor well has fallen from 120° Fahr. to atmospheric temperature. Formerly, the use in the Livesey washers and the tower scrubber of liquor previously stored at comparatively high temperature in contact with air, reduced the cyanide content of the gas and increased the amounts of thiocyanate and thiosulphate in the liquor. The diminution in the temperature of the liquor in the tar and liquor well, in addition to causing a smaller loss of ammonia, has resulted in less oxidation of the liquor. In consequence a smaller removal of hydrocyanic acid from the gas in the Livesey washers and tower scrubbers has occurred and the amount of thiocyanate in the final liquor has fallen from the equivalent of 650 parts of oxygen absorbed per 100,000 to 410 parts; the quantity of thiosulphate has decreased from the equivalent of approximately 160 parts of oxygen absorbed to 80 parts. A further reduction in the quantity of hydrocyanic acid taken out of the gas has been obtained by replacing the liquor employed in the scrubber by a small quantity of water.

Relative Volumes of Ammonia Liquor and Spent Liquors.—With the conditions of operation of the ammonia sulphate plant at Hinckley, the total volume of effluent of which 14 p.ct. consisted of devil liquor, was 1·4 times the volume of liquor distilled. The monohydric phenols were distributed on distillation in the proportion of 47 p.ct. in the devil liquor and 53 p.ct. in the spent liquor from the still. An improvement of 20 p.ct. in the oxygen absorbed value of the total effluent would be attained if the devil liquor were treated separately by such method as evaporation in a chimney.

Biological Purification of Effluents.—Small-scale experiments on the purification of effluent gas liquors by biological filtration have shown, under the conditions specified, an 85 p.ct. purification of effluent liquor when two filter beds in series are employed. Properly matured filter beds may also be used for the purification, without the addition of town sewage, of mixtures of effluent spent liquor and bacterially purified effluent containing 8 p.ct. of untreated spent liquor.

Large-scale percolating filter beds at the Foleshill Gas-Works, Coventry, are being matured by using town sewage with increasing proportions of admixed spent liquor. At the present time 40 p.ct. of the total volume of spent liquor made on the works is being treated in this manner with a purification of 74 p.ct. calculated on the oxygen absorbed value of the feed to the beds or 95 p.ct. of the oxygen absorbed value of the undiluted spent liquor.

Relative Volumes of Sewage and Effluent Gas Liquor.—The volume of effluent gas liquor produced at Hinckley when the sulphate plant is in operation is approximately 1 p.ct. of the dry weather flow of sewage. The sulphate plant is only operated periodically. If a suitable balancing tank were installed, effluent liquor could be run continuously into the sewers in the proportion of about 0·5 p.ct. of the sewage flow. In this connection it should be noted that the flow of sewage is much less during the night hours than during the day.

Methods of Disposal at Various Gas-Works.—During the past year numerous inquiries have been received as regards the methods to be adopted in overcoming the particular difficulties experienced by individual gas undertakings in the disposal of effluent liquors.

In the First Report of the Research Committee it was concluded that the admixture of gas liquor effluent with sewage appeared to be the only satisfactory method of disposal known at the time. The conditions of purification should be adequately controlled, and large and sudden changes in the proportion of gas liquor effluent in the mixture should be avoided by the installation, if necessary, of balancing tanks to allow for periods when the ammonia distillation plant is not in operation. Recommendations based on this conclusion have been made in several instances where the gas-works serves the same area as is served by the sewage works and no special circumstances arise; and further experience has definitely proved that in normal circumstances the admission to the sewers of effluent liquor in approximately constant proportion to the

sewage flow is a technically satisfactory method of disposal.

In addition to the carefully controlled admission of effluent to the sewers, the evaporation of devil liquor by injection as a fine spray into the base of a boiler or retort-house chimney and the use of effluent liquor in place of water or steam in producer furnaces have been advocated with the object of reducing the quantity of effluent. The evaporation of devil liquor in the manner suggested appears to have been satisfactory, and reduces the total work of effluent purification by about 20 p.ct. So far experience in the use of effluent liquor in producer furnaces, which should reduce the total volume by from 20 to 30 p.ct., is insufficient to enable conclusions to be drawn.

In one instance, where a large area of ash heaps of a depth of 20 ft. was available, it was suggested as an experiment that the effluent liquor should be distributed on the heaps by suitable sprays. This experiment, however, did not give satisfactory results.

Another gas undertaking reported difficulty in the disposal of effluent water from the condensers of a carburetted water gas plant. In this plant the cooling water comes into direct contact with the carburetted gas, and after gravitational separation of tar the water is filtered through coke and run to waste. Objection had been raised owing to the presence of oil on the waste water, but a sample examined gave an oxygen absorbed value of 45 parts per 100,000, which is very low compared with effluent from the distillation of ammonia liquor.

Mr. C. F. BOTLEY (Chairman of the Committee) presented the Report.

The PRESIDENT: There is a point I should like to mention before inviting discussion. This question is an important one; it does not affect every works, but there is no reason why those unaffected should stand aloof. If those of us who are free from this difficulty in regard to effluents can help those who are in trouble, it is our duty to do so. In my own particular works the effluents from the sulphate plant do not introduce difficulty at all, though we take every precaution to keep them as pure as possible. One point which has impressed me in regard to this Report is that of the separation of the tar and liquor. I would remind you that years ago we were taught that tar and liquor were to be separated as quickly as possible, because of the naphthalene. This involves another question which will have to be borne in mind by the Research Committee. On my own works we try to separate the tar as quickly as we can from the liquor in the initial stages, and it is a good many years since we had a single naphthalene complaint, but it has to be considered in connection with this question. I should like to ask the bacteriologists how they treat their sewage at Coventry. I have had some experience of the septic system at Beckton, and it occurred to me to ask whether they were applying that system at Coventry, inasmuch as it is a large inland town. Of course, on the seaboard, with a great flowing tide with a 50-ft. rise and fall, as we have at this end of the Bristol Channel, the sewage question is not a very difficult one, because we carry sewage right out into the channel, and the tides sweep it away to the Atlantic; but the towns in the Midlands, situated 120 or 150 miles from the seaboard, must have problems which have not to be faced in towns such as Cardiff and Bristol.

Prof. J. W. COBB, who also introduced the Report, said: I do not think there is very much I need add to the exposition of this Report which has already been made by its Chairman, Mr. Botley, who has displayed the liveliest interest in all proceedings of the Committee from the moment of its formation. I should like to say, however, concerning the nature of the work, that there are two aspects of it. One is that we are proceeding to the best of our ability to review the general question of the disposal of effluents, to find a solution, or possibly a number of solutions, of the urgent question which arises of how the production of harmful constituents in gas liquor at the works is to be minimized, both as regards their quantity and as regards the volume of water in which they are contained; and also to solve the further question of how that effluent, even when its quantity has been minimized, is to be treated so as to ensure that our streams may remain unpolluted. Those are two distinct questions, with both of which the Committee is concerned. It is, therefore, concerned at once with the technique at the gas-works in the original production of the liquor, and with the further technique of purification when the liquor leaves the works. We are under no delusion as to our ability to provide a complete, satisfactory, and economic solution of that problem, at any rate in a limited time, but we are doing our best; and while we are working at it we have in mind, too, the fact that difficulties are arising all over the country with those responsible in gas-works on which immediate advice is required. A number of questions have been addressed to us, either through Mr. Botley or directly, concerning these difficulties. It is very astonishing—and I must emphasize this point—to find what a large proportion of those questions have already been answered in the able summary which was prepared by Dr. Parker when this Committee began its work; and I recommend that summary, as contained in the First Report, for careful perusal by anybody who is interested in this question or who is faced with some problem connected with effluents. On the other hand, there are some questions which cannot be answered by that summary, and we have done our best to reply to them directly. Dr. Parker and Dr. Monkhouse have visited works and have taken samples when necessary, and we have given advice to the best of our ability. At the same time, I should like to point out that there are limits to what we can do in this respect with our monetary and human resources, and we have had to formulate some sort of principle which guides us in the extent to which we may involve ourselves in reply to those immediate questions, often on matters of detail. I might here read a sentence from the summary, a sentence which expresses what I believe is the attitude of the Committee on this matter. "In dealing with them"—that is, with questions that are put to the Committee by individual concerns or persons—"the Committee has been guided by the consideration that, though it has not the function of working out detailed schemes, or the resources for that purpose, it can give service in general terms and examine any features specially relevant to its work."

Dr. A. PARKER: With the President's permission, I think the best thing I could do would be to give a résumé of methods of alleviating the troubles connected with the disposal of effluents—methods which have been proposed in the summary of the First Report of the Committee—because that First Report has never been presented formally to the Institution and discussed.

In the First Report an account was given of existing knowledge of the subject of disposal of liquor effluents from gas-works. According to usual practice in gas-works, the tar and liquor which collect in the various sections of the cooling system are allowed to flow direct into a common tar and liquor well, with the result that the liquor, at comparatively high temperature, is in contact with tar for long periods. In addition, liquor from the common well is frequently circulated through sprays in the hot foul gas mains, and through washers or ammonia scrubbers. Generally, the volume of ammonia liquor ranges between 30 and 50 gallons per ton of coal carbonized, and the volume of effluent which results from the distillation of the crude liquor varies from 45 to 75 gallons per ton of coal. The effluent consists of spent liquor from the still, 85 to 90 p.ct. by volume, and devil liquor from the coolers, 10 to 15 p.ct.

The principal obnoxious constituents of ammonia liquor are higher tar acids, monohydric phenols, thiocyanate, and thiosulphate. When ammonia liquor is distilled, these constituents are afterwards found in the spent liquor and the devil liquor. The difficulties of treatment and disposal of gas liquor effluents would, therefore, be diminished if systems of condensation and separation of ammonia liquor could be devised which would result in smaller quantities of the objectionable compounds being dissolved by the liquor. This appears to be the most rational method of attacking the problem.

Phenols and higher tar acids should be classed as tar, but they are to some extent soluble in liquor. The deposition and storage of tar and liquor together gives every opportunity for ammonia liquor to dissolve phenols and higher tar acids; and it is frequently found that a larger total quantity of monohydric phenols is present in the liquor than in the tar. Improvements in the composition of ammonia liquor and effluent liquor as regards tar acids should result from modifications designed to remove the major portion of the tar before liquor condenses and to effect early separation of tar and liquor. The deposition of tar from crude gas at temperatures above 70° C., before condensation of aqueous vapours occurs, might be effected by apparatus of the type ordinarily employed in coke oven installations in which ammonia is recovered by the direct process. Electrostatic methods of tar precipitation are also worthy of serious investigation.

Solutions of ammonia dissolve sulphuretted hydrogen and hydrocyanic acid, with formation of sulphide and cyanide, which in presence of oxygen give rise to thiosulphate, thiocyanate, and hydrosulphide. The circulation of liquor, containing hydrosulphide, through washers, removes hydrocyanic acid from the gas and increases the quantity of thiocyanate in the liquor. It would therefore appear that an improvement in the composition of ammonia liquor would result from rapid cooling of the gas, already freed from heavy tar at 70° C., and rapid removal of liquor from the condensing system. The circulation of liquor in mains and scrubbers should be reduced to the minimum, and the quantity of oxygen in the gas should be kept as low as possible by level-gauge conditions at the retorts and the admission of air for purification at the inlet to purifiers after all liquor has been removed.

The installation of a washer supplied with dilute sulphuric acid in place of the usual water scrubber reduces the volume of liquor, since the acid liquor from the washer may be used in the saturator of the sulphate plant.

In coke-oven installations in which ammonia is recovered by the direct process, the only effluent of any importance is the liquor which separates out in the condensers following the

saturator. This liquor is comparatively rich in monohydric phenols, but contains only very small quantities of higher tar acids, thiocyanate, and thiosulphate. The direct recovery of ammonia has been tried in gas-works, but has not proved satisfactory. It is possible, however, that the usual type of saturator might be replaced by an acid washer in which the strength of the solution is kept below saturation point. The solution could then be withdrawn as necessary, and evaporated for the recovery of salt.

Phenols, higher tar acids, thiocyanate, and thiosulphate are objectionable constituents of effluents, since they readily absorb oxygen and unduly retard self-purification of streams and increase the work of purification of sewage if admitted to streams or sewers in sufficient quantities. The oxygen absorption capacities of effluent gas liquors range from 300 to 1000 parts per 100,000, whereas the corresponding figure for an average sewage is about 10 parts per 100,000.

Effluent gas liquor might be purified either by the removal of the obnoxious constituents by physical or chemical methods, or by the conversion of these constituents by chemical, biological, or other means into substances which do not absorb oxygen.

Processes for the extraction of phenols and higher tar acids from ammonia liquor or effluent liquor by solvents or absorbents are mentioned in the First Report. The solvent usually employed is commercial benzole, though trichlorethylene and light tar oil have also been used; reference is also made to experiments with activated carbon as an absorbent. These processes, however, require further examination before definite opinions as to their value can be given.

Partial purification of effluent can be obtained by the use of dephenolating towers provided with steam and flue gases, but the process is expensive in steam in consideration of the comparatively small amount of purification which results.

In districts where the gas-works serves the same area as is served by the sewage works, and no special circumstances arise, the volume of effluent gas liquor is usually less than 1 p.ct. of the dry-weather flow of sewage. Sewage containing gas liquor effluent in this proportion can be satisfactorily purified by usual bacterial methods, including activated sludge processes, provided the conditions of purification are adequately controlled, and large and sudden changes in the proportion of gas-works effluents are avoided.

Purification to the extent of about 95 p.ct. can be effected according to the method of G. J. Fowler, by bacterial filtration of gas liquor effluent without admixture with sewage. This amount of purification is insufficient to allow the treated effluent to be run into streams of small volume, but is ample to prevent any appreciable influence on sewage purification if discharged into sewers. This process, however, is expensive in initial outlay.

In many instances, the devil liquor might be evaporated by injection as a fine spray into the base of a boiler chimney or retort house chimney. The total work of effluent purification required can, by this means, be reduced by about 20 p.ct. From 20 to 30 p.ct. of the total volume of effluent might also be evaporated by use in the producer furnaces in place of the steam or water ordinarily supplied.

Several of the proposals which have been made to improve the composition of gas liquor and to effect the purification and disposal of the effluent liquor are under investigation at Hinckley and Coventry, where facilities have been provided by Mr. Lee and Mr. Langford and their Committees. At these two works, Dr. Monkhouse has conducted experiments, described in the Second Report, on the rapid separation of tar from hot gas by a spray type extractor, methods of reducing the quantities of thiocyanate and thiosulphate in ammonia liquor, and the biological purification of spent liquor. These experiments, which Dr. Monkhouse will briefly describe, are being continued, and as a result of a generous offer from Messrs. Lodge-Cottrell an electrostatic tar precipitator is to be installed at Hinckley, and the possibilities of this method of tar deposition are to be investigated.

Summarizing the present position, it has been shown that:

(1) The quantities of the obnoxious constituents, higher tar acids, thiocyanate, and thiosulphate in ammonia liquor, and consequently in the effluent liquor, can be reduced by (*a*) the deposition of the major portion of the tar from the hot gas before liquor condenses, (*b*) the rapid cooling of the gas and rapid separation of tar and liquor collected at each point of the condensing system, (*c*) the minimum circulation of liquor in contact with gas, and (*d*) ensuring a minimum quantity of oxygen in the gas by level gauge conditions at the retorts and the admission of air for purification at the inlet purifiers after all liquor has been removed.

(2) The devil liquor can be evaporated by injection as a fine spray into the base of a hot chimney. The total work of effluent purification can, by this means, be reduced by about 20 p.ct.; and an additional 20 to 30 p.ct. of the total volume of effluent might be evaporated by use in the producer furnaces in place of the steam or water ordinarily supplied.

(3) In normal circumstances, the admission to the sewers of effluent liquor in approximately constant proportion to the sewage flow is a technically satisfactory method of disposal. Large and sudden changes in the proportion of gas liquor effluent should be avoided by the installation, if necessary, of balancing-tanks.

Mr. SAMUEL GLOVER (St. Helens): What are the tanks?

Dr. PARKER: They are really storage tanks to enable the flow of liquor to be regulated to a constant proportion of the sewage, because in most gas-works the sulphate plant is run perhaps for three weeks and is shut down for three weeks.

Dr. ALLAN C. MONKHOUSE also introduced the Second Report.

Discussion.

The PRESIDENT: There is one point, mentioned to me by Mr. Botley, upon which I would like information, and that is whether there was a thesis on the treatment of liquor effluents. Though I am Chairman of the Board of Examiners, I have been given a little relief this year, and am not clear on the point. Perhaps Mr. Thorman, who is a member of the Board, can give us the information.

Mr. J. S. THORMAN (Southall): I am very glad to be able to report that there were two theses on the treatment of liquor effluent. One of them was, I think, the best thesis we have had presented to us; but, unfortunately, the engineering part of the candidate's work is not sufficient to enable us to recommend him for a Diploma. The thesis is one of the very best I have read. It is not for publication, however, so that I do not think I can tell you exactly where it came from. There was another excellent one, from a gentleman who is here this afternoon. Some very valuable work has been done on the subject, and I am glad to know, as one of the Examiners, of the keen interest that is being taken in the examination of liquor, particularly with a view to getting rid of the bugbear of disposing of the effluent liquors from the sulphate works. I really think that The Institution of Gas Engineers should be proud of the work which is being concentrated by our younger members on this very important subject.

The PRESIDENT: It occurred to me that these two theses might be of considerable help to Mr. Botley, and perhaps we, as an Examining Board, might be able to pass them on to him for examination.

Mr. THORMAN: I certainly think we could pass on one of them, but it was particularly requested that the other should not be published.

The PRESIDENT: I did not mean that it should be published, but that it might be handed to Mr. Botley, by arrangement with the candidate. I think we might leave the matter in the hands of Mr. Botley, who, I am sure, will deal with it very discreetly.

Mr. BOTLEY: Certainly. I should be very glad to have it.

Mr. THORMAN: I think the other one could be published.

The PRESIDENT: There are two members of the Committee who do not belong to the Institution. One is Dr. T. Lewis Bailey, whom I know very well, and who for many years has been a great friend of ours in South Wales. The other is Dr. H. T. Calvert, of the Ministry of Health. We are greatly indebted to these gentlemen for the work they have done. Dr. Lewis Bailey is Chief Inspector under the Alkali Acts. He was our Chief Inspector here before he went to London, and I can speak personally of him, since I have been associated with him for twenty years.

Mr. J. FERGUSON BELL (Derby): I should like to take part in the discussion on this important question. As the President has said, it does not affect towns on the seaboard; but in inland towns, especially those near rivers, it is a very difficult question, and I think it will become more difficult as time goes on, because the Government is taking special precautions to prevent river pollution. It seems to me that the solution is to produce an effluent which the local authorities will take in the sewage. I am very glad to hear such encouraging reports as we have just heard with regard to the work the Committee and its Research Chemists have done. In Derby the problem has given us considerable trouble. Our chemical staff have been working at it for two or three years, and we have partially overcome the difficulty by installing very large settling tanks, through which the liquor follows a zigzag course; after leaving the tank it flows along the course, in which it is aerated, and then passes through clinker and coke filters. In this way we are able to produce an effluent which the Corporation is willing to take for disposal. I think we shall encounter difficulties if we try to put this effluent liquor into fishing rivers and streams; and we want to work in conjunction with our local authorities. I shall be very pleased to place at the disposal of the Committee the results of our investigations. We have made an analysis of the liquor almost every week, and we are careful to see that the effluent is such that the Medical Officer of Health and others concerned have no objection to taking it away in the sewage. The sewage is treated at Derby by the bacteria process and the activated sludge process, and you will appreciate that it is necessary to keep the oxygen-absorption constituents in our effluent as low as possible. I wish the Committee every success. It is encouraging to hear what Prof. Cobb has said with regard to ultimately obtaining a satisfactory and an economic solution of this difficult problem. I lay stress on the economic aspect of the question. Two or three weeks ago I was attending a meeting of a Company of which I am a Director, and the

Manager reported that a very large firm who had been taking the liquor had refused to take it in future unless they were paid 1s. per ton to get rid of it. This is what we are up against, and it will be necessary, therefore, for a medium-size gas-works to put up sulphate of ammonia plant or concentrating plant so as to reduce the bulk of the liquor and to get the chemical people to treat it. I can only add that I appreciate very much the work of those concerned with this matter, and wish them success.

The PRESIDENT: May I ask that you will be good enough to communicate the information you have to Mr. Botley? We want to co-ordinate all we can, and I know that Mr. Botley will appreciate information from every source.

Mr. FERGUSON BELL: I shall be pleased to place at Mr. Botley's disposal the information I have with regard to our present system, and no doubt if Prof. Cobb, Dr. Parker, and Dr. Monkhouse would care to visit Derby, our Chief Chemist and other members of the staff will give them full particulars. I will also send them plans of the works, to show them what we are doing. Before we installed our large tanks, we had to get rid of the liquor by evaporating it, which, as you know, is a difficult and expensive process. Formerly we slaked the coke with it, but that was objectionable. I shall be pleased to do all I can to help, because I realize the great importance of this matter, especially for smaller works which have not much ground space. We have many acres at Derby, and, therefore, we are able to employ large tanks. One important thing to have is a balancing tank, by means of which one is able to discharge a small quantity regularly day by day, instead of discharging varying quantities, and sometimes large flushes, in dry weather.

Mr. P. S. HOYTE (Plymouth): With regard to the admission of the air, Dr. Parker has said that at Hinckley they are admitting it at the inlets of the purifiers, and Mr. Botley, I believe, said they are admitting it at the inlet of the exhausters at another works. We have found that the effect of admitting air at the inlet to our purifiers, at the end of the washing system—we have a wet purification system—is practically negative, and we had to revert to admitting it at the inlet to the exhausters. Whether a streamline effect is formed, and the air does not mix with the gas when it is admitted at the inlet to the purifiers, I do not know, but several engineers have had the same experience as we have had, and if someone could clear the matter up it would be of assistance to others as well as to us at Plymouth.

Mr. H. E. COPP (Hull): I should like to ask which problem is considered to be the greater one—the toxic effect of the constituents of the spent liquor, or the absorption of oxygen due to the presence of phenolic bodies. I do not know whether or not I have transgressed the anti-vivisection laws, but I have made a number of experiments on small fish, and find that a very small percentage of spent liquor is sufficient to cause the fish to turn their tails up in a few moments, and I have distinctly traced the effect to the absence of oxygen, not to the toxic effect.

Mr. L. H. SENSICLE (Newcastle-on-Tyne): I should like first to express my appreciation of the fundamental manner in which the Committee is attacking this problem of the separation of tar acids and thiocyanates, thiosulphates, and so forth from the liquor. It seems, however, that the work it is doing is ultimately going to lead us to the necessity for the removal of tar at a high temperature, and probably to the adoption of direct recovery. The Chairman of the Committee alluded to direct recovery, and Dr. Parker said it had been tried, but had proved to be a failure. I think it would be fairer if direct recovery were treated by the Committee as one of the subjects for investigation. It was mentioned in the Report prepared a year ago, but in the present Report it does not appear that any special work has been done in the matter. Direct recovery has been practised for a number of years in the coking industry with great success, and it does not appear that there can be any very serious obstacles to its adoption in the gas industry. Direct recovery gives an effluent which contains practically only monohydric phenols as oxygen-absorbing constituents; and these can be removed by washing with benzole. The process has been adopted in America with profit, and the other substances, such as thiocyanates and thiosulphates, cannot enter into the problem because the tar has to be removed at a high temperature before the gas passes into the saturator, and there is no ammoniacal liquor with which the gas can come into contact. Again, the question of direct recovery has a bearing on the cheapening of sulphate of ammonia manufacture, because it eliminates a large number of losses due to the ammoniacal liquor and that kind of thing. The sulphate saturator is placed at the beginning of the series of extraction apparatus, and ammonia is recovered right away, immediately after tar extraction. Tar extraction has also proved satisfactory at high temperatures without adopting very special precautions, such as electrostatic separation, which is being tried; and I think that if the Committee could try these methods on an experimental scale in a gas-works, it might be well worth while to do so, rather than to set out the new methods which have not been tried before in other places. One of the factors which it has been suggested would lead to difficulties in connection with direct recovery is the varying output of gas at a gas-works; but it seems to me that this difficulty could be overcome by the adoption of a special type of saturator containing two compartments, an inner and an outer, or by using saturators of different sizes.

Mr. C. F. BOTLEY: The Committee and I are gratified that the members are evidently taking a very live interest in this matter, and it is interesting to find that the juniors are inspired to deal with the subject. With regard to Mr. Sensicle's remarks, I have observed with great interest his work in connection with ammonia, and I am afraid he will not escape my application for information. I must ask him not to suggest, however, that the Committee has lost sight of direct recovery. It has not the slightest intention of doing that, but it is limited in its resources, and feels that it is better to pursue one point to the end before taking on something else. Believe me, it has not the slightest intention of neglecting direct recovery, or anything else. At the same time, I am indebted to you for reminding us of the point. With regard to the remarks of Mr. Ferguson Bell, I can assure him that it will not be long before some of us come along to see his plant. The help he has offered is the sort of assistance the Committee need, because we do not want to go over ground which has been covered before. I ought to have mentioned that the Second Report of the Committee, in detail—you have only a summary before you now—will be found in the Bulletin of the National Gas Council, which is now in course of publication. If any of you wish to pursue any of these points, you will find the full details there, and you have the additional information supplied by the research chemists to-day, so that you will have the full picture of what has been done. I am obliged to those who have taken part in the discussion on what is a difficult, though not very spectacular, problem.

Mr. J. S. THORMAN (Southall): Inasmuch as the President has asked for the information, I think I ought to say that it was Mr. John Grayston who submitted a thesis entitled "Some Aspects of Tar and Liquor Separation." He was awarded the Diploma with distinction under all three headings—his thesis, his written examination, and the oral examination—which he passed with 100 p.ct. marks. The members of the Institution no doubt will be glad to hear what an excellent place Mr. Grayston obtained.

The PRESIDENT: I am glad to have that information.

Forthcoming Fuel Conference.

It was stated by the President (Sir David Milne-Watson, LL.D., D.L.) at the recent annual general meeting of the National Gas Council of Great Britain and Ireland, that arrangements for the meeting of the Fuel Section of the World Power Conference, which is to be held in London from Sept. 24 to Oct. 6 of this year, were well advanced, and that the favourable response given to the Technical Committee's proposals augured well for a most valuable and important conference. British contributions to the Section dealing with carbonization are being prepared under the auspices of the Joint Committee of The Institution of Gas Engineers, the Coke Oven Managers' Association, the Fuel Section of the Society of Chemical Industry, and the Institute of Fuel. The list of British papers for which the Technical Committee have arranged is such that they have every justification for their confidence that the matter will reflect great credit on the fuel industry of this country. The papers relating to the carbonization industry will deal with subjects of vital importance, and will be presented by high authorities in the various branches. It is to be hoped that all who can possibly do so will arrange to attend; and readers are reminded that applications for membership forms should be addressed to the Secretaries, Fuel Conference, 1928 World Power Conference, 36, Kingsway, London, W.C. 2.

"Boiler House Efficiency and Economy."—An enormous amount of research, theorizing, and experiment had been carried out during the last fifty years in connection with the furnace side of the steam boiler, almost uselessly, said Mr. T. Roland Wollaston at the summer meeting of the Institution of Heating and Ventilating Engineers, at Blackpool, on June 19, in that the compilers had nearly always started from unsound bases—the orthodox flat-grate thin-fire furnace and the assumption that convection played the most important part in transferring heat from fuel to water. In burning coal on such grates, they were told that the utilization of 50 p.ct. excess air with (say) 12 p.ct. CO_2 in the resultant chimney gas constituted excellent practice. Then again it had been the custom to rate boilers on "heating surface," regardless of its location in relation to the fire. Nothing could be more absurd. One found constantly guarantees of from 5 lbs. to 8 lbs. evaporation per sq. ft. of heating surface per hour from boilers; but it was obvious that the rate of evaporation from the surface nearest the fire must be many times that of the surface farthest away. Dealing with the relative value of radiant heat from the incandescent fuel as compared with convected heat, the conclusion might be drawn that radiant heat was much more useful than convected in water heating and steam raising. Mr. Wollaston looks forward to the tubeless boiler in which, by converting all the heat possible into radiant heat, evaporation of the order of 30 to 50 lbs. per sq. ft. of heating surface per hour will be obtained. This, he suggested, would be obtained by adopting gas producer practice in the design of a producer boiler.

WATERLESS HOLDER MANUFACTURE IN ENGLAND.

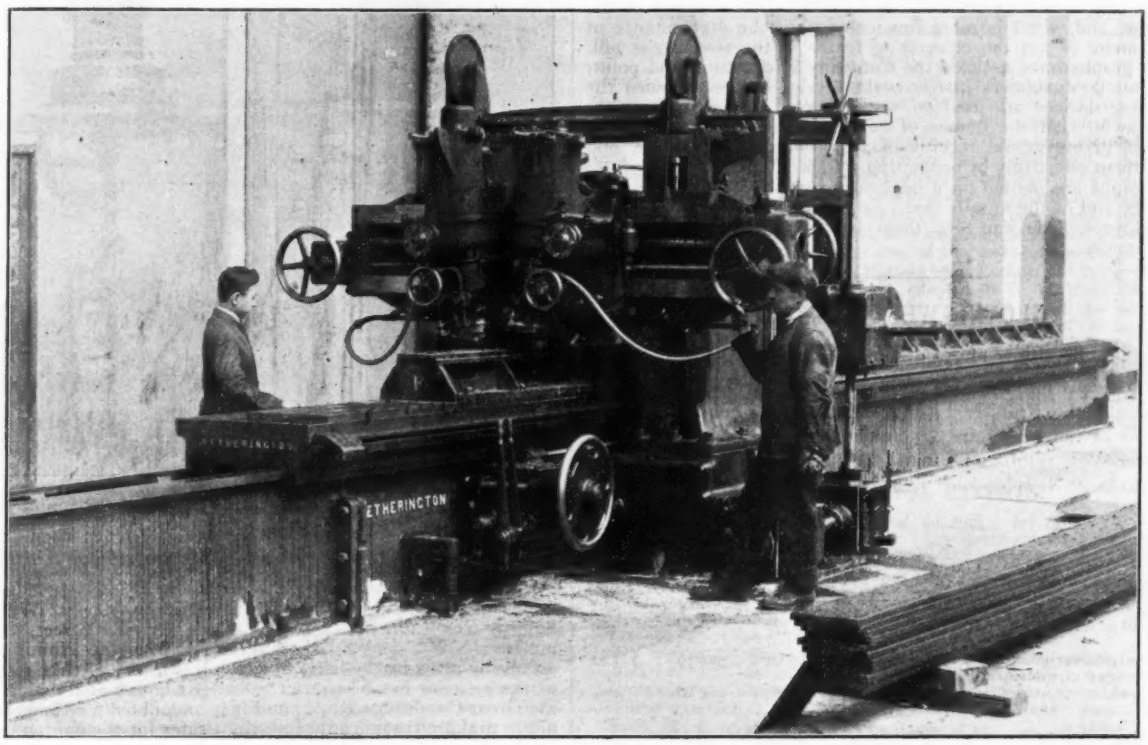
Special Machines Installed by Messrs. R. & J. Dempster.

During the full discussion on the subject of waterless gasholders which took place at the Gas Session in connection with the recent celebration of the centenary of incorporation by Royal Charter of the Institution of Civil Engineers, Mr. Thomas Hardie said that it had given him much satisfaction to see, in an engineering works in the North, that they had installed the elaborate machines necessary for the purpose of producing these holders in this country as cheaply and economically as they could be produced anywhere.

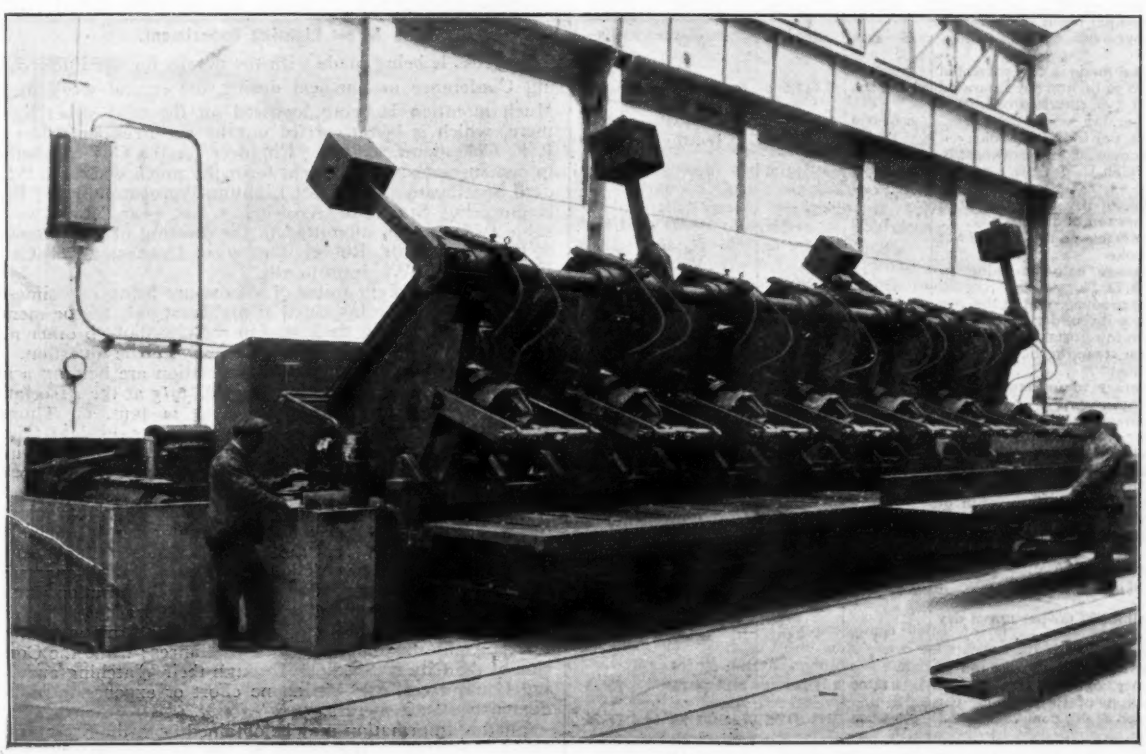
The works to which Mr. Hardie referred were those of Messrs. R. & J. Dempster, Ltd., of Manchester; and the accompanying photographs, for which we are indebted to the firm, will be of interest, as showing the character of the machinery which has been put down at great expense in order that waterless gasholders may be entirely constructed in this country.

The plate bending machine is the largest of its kind, and embodies alterations which experience has proved desirable while operating the plant in America and Germany; and the special milling machine has been designed by a prominent Manchester engineering firm, and is working to their guarantee.

Gas engineers interested in these structures have already been cordially invited through our columns to see the machinery referred to in operation at Messrs. Dempster's Works.



THE SPECIALLY DESIGNED FIVE-CUTTER MACHINE FOR MILLING THE STANCHION PLATES FORMING THE POLYGON.



COLD BENDING THE SHELL PLATES AND PARTS FOR THE PISTON AND ROOF.

DEALING WITH HIGH BILLS.

In cases where large quantities of gas are used for heating purposes—with the consequent wide fluctuations in demand that are caused by variations in temperature—it is desirable to find some method of retaining the customer's goodwill when he receives a high bill. Mr. H. M. Pace, of the South Carolina Power Company, Charleston, has explained in the "American Gas Association Monthly" that graphs indicating the low temperatures for each day of the month and the actual consumption of a room-heating customer (which is obtained by daily meter readings) are effective in pointing out the demands that are made on the service when the temperature begins to drop.

During several years past, his Company have used these to good advantage. The graphs have not only enabled the Company to show clearly the demand on the service, but they have been helpful also in showing the value of daily readings of the meter, and, what is more important, that the performance of the meter is not the controlling factor in the size of the bill. The graphs have assisted the Company in detecting and pointing out to customers just how the service is wasted when the heating devices are used on warm days. The district service men who visit the homes of customers to read meters carry copies giving actual records of temperature fluctuations, and use them effectively in preventing "kicks" about bills.

Graphs are plotted on a duplicating stencil from day to day. At the end of the month copies are made and distributed to the employees, who can use them in their daily contacts with customers.

GLOVER-WEST VERTICALS.

Results of an Installation at Stamford, Conn.

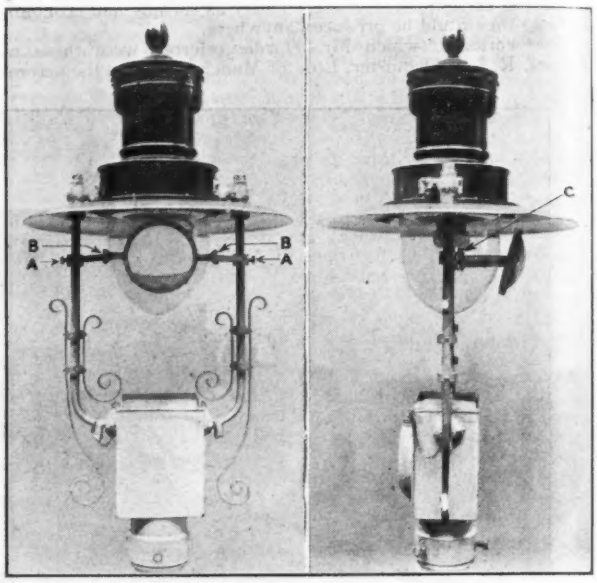
The following table epitomizes the results obtained in tests conducted by Prof. J. T. Ward and the Carbonization Committee of the American Gas Association, on an installation of Glover-West retorts at Stamford, Conn., U.S.A. The retorts are 40-in. "New Model," sixteen in number, arranged in units of two.

—	Pittsburg Coal.	Elkhorn Coal.		
Calorific value of gas to be supplied in B.Th.U. per c.ft.	530	530	500	480
Coal—				
Total coal carbonized in tons	1751·63	477·67	524·19	217·72
Average p.ct. moisture of wet coal	2·22	4·83	3·86	4·09
Proximate analysis (dry basis)—				
P.ct. volatiles	34·29	37·23	39·57	38·95
P.ct. fixed carbon	58·38	58·90	57·90	58·37
P.ct. ash	7·33	3·87	2·53	2·68
Calorific value in B.Th.U. per lb., dry	14,086	15,650	16,270	16,080
Tons per retort in operation per day	4·05	4·39	3·75	3·89
Gas—				
Total made in c.ft. corrected to 30 in. and 60° saturated	28,053,200	8,242,600	9,769,200	4,486,000
C.ft. per retort in operation per day	64,932	75,822	69,940	80,107
C.ft. per ton of dry coal	16,016	17,248	18,637	20,604
Average calorific value in B.Th.U. per c.ft.	530·1	531·2	499·5	481·0
Coke—				
Lbs. of dry coke produced per ton of dry coal.	1,567	1,547	1,497	1,445
Average p.ct. moisture of wet coke	3·51	..	6·61	7·39
Average calorific value in B.Th.U. per lb.	12,769	..	..	..
Dry producer fuel in lbs. per 100 lbs. of dry coal.	13·73	13·68	13·29	14·63
Steam to retorts—				
P.ct. steaming based on dry coal	11·98	15·26	29·45	39·15
Average temperature at retorts, ° Fahr.	375	276	274	215
Average per day in lbs.	16,796	23,370	34,580	27,280
Water evaporated—				
Average per day in lbs.	88,250	99,078	81,204	
Surplus available per day in lbs.	71,454	75,708	46,624	Boiler
Actual evaporation per lb. of dry fuel in lbs.	4·59	4·74	4·71	shut
Equivalent evaporation from and at 212° Fahr. in lbs.	5·74	5·89	5·95	down
Actual evaporation per ton of dry coal in lbs.	1,410	1,452	1,394	
Tar—				
Gallons of tar per ton of dry coal	13·70	15·02	12·49	12·24
Ammonia—				
Lbs. of sulphate per ton of dry coal	14·09	18·22	18·29	23·33
Gallons of 10 oz. liquor per ton of dry coal	16·74	21·65	21·73	27·73

[Extracted from the May issue of "West's Gas."]

"TOTTENHAM" SPOT-LIGHT ATTACHMENT FOR PUBLIC LAMPS.

A useful device, which is illustrated below, has been designed by the Public Lighting Superintendent of the Tottenham District Light, Heat, and Power Company for directing a beam of light on to any desired object. It has been found particularly successful at busy road junctions, in making the signals of the point policeman clearly discernible to approaching traffic at night.



Spot-Light Attachment.

A.—Set-screws for raising and lowering lens; also for lateral adjustment. B.—Wing-nuts for adjusting angle of beam. C.—Draw-pin to allow apparatus to be swung clear of globe without alteration to any adjustment.

The attachment, which is being made by Messrs. William Sugg & Co., Ltd., of Ranelagh Works, Chapter Street, Westminster, S.W., does not in any way reduce the illumination ordinarily given by the lamp to which it is fitted. At the request of the police it has been attached to gas lamps at junctions on the Great Cambridge Road; and it is undoubtedly an important aid in making traffic control at night safer for the policeman as well as for the motorist.

ASSOCIATION OF PUBLIC LIGHTING ENGINEERS.

Street Lighting Experiment.

Progress is being made with the details for the Public Lighting Conference at Sheffield during the second week in July. Much attention is being focussed on the trial street lighting there, which is being carried out by the President-Elect (Mr. J. F. Colquhoun, Lighting Engineer for the City of Sheffield), to demonstrate in a practical form the much discussed "Standard Specification for Street Lighting" prepared by the British Engineering Standards Association last year. This was the subject of a paper submitted to the meeting of the Association at Brighton by Mr. Robert Watson, of Doncaster, and Captain Jolley and Mr. Waldram jointly.

No less than eight miles of streets are being experimentally lighted, and will be inspected at night not only by the members and delegates during their stay in the city, but on other nights by various scientific bodies interested in the question. The British Engineering Standards Association are holding a meeting of the Street Lighting Section No. 39/5 at the Association's headquarters at the Grand Hotel at 11 p.m. on Thursday, July 12, after which conveyances will be provided to take the members out to view the demonstration; while the officials of the National Physical Laboratory, Teddington, have arranged for an all-night test, in conjunction with the members of the Lighting Association, with a view of getting accurate results on the spot and data for use after the conference to enable them to draw conclusions from the demonstration.

The whole of this work is the result of a wish expressed at the Brighton conference last year that the information contained in the Specification should be put to a practical test. To enable this to be done, a number of public lighting firms are rendering assistance by the loan of various appliances; while the Corporation of the City of Sheffield, through their Watching and Lighting Committees, are sparing no effort or expense to make the demonstration a success.

Further information may be obtained from the Secretary, Mr. W. J. Liberty, at the offices of the Association, 68, Victoria Street, S.W. 1.

REGISTER OF PATENTS.

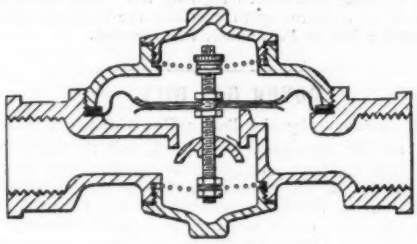
Automatic Control Devices.—No. 289,943.

SUGG, W., & Co., LTD., and SUGG, P. H., both of Chapter Street, S.W. 1.

No. 3044; Feb. 2, 1927.

This invention relates to improvements in control devices of the type in which a valve member is automatically controlled by the pressure of the gas, and provides that the valve member is resiliently carried by a spring or springs, with means for adjusting the resistance thereof.

In one form of construction, which will be understood from the section reproduced, the valve member is secured to a stem clamped



A Sugg Control Valve.

at one end to the inner convolution of a spiral spring arranged in a plane substantially at right angles to the direction of movement of the valve member; the outer convolution of the spring being clamped by a flanged cover plate to the casing through which the gas flows. The other end of the stem is screw-threaded to receive a knurled nut having a circumferential groove to receive the inner convolution of a second spiral spring, the outer convolution of which is clamped to the casing by a removable cover plate. Intermediate the upper spring and the valve member is a flexible diaphragm formed of leather which is clamped to the stem and to the casing, so forming a chamber separate from the chamber through which the gas passes, the upper spring and knurled nut being located in the separate chamber.

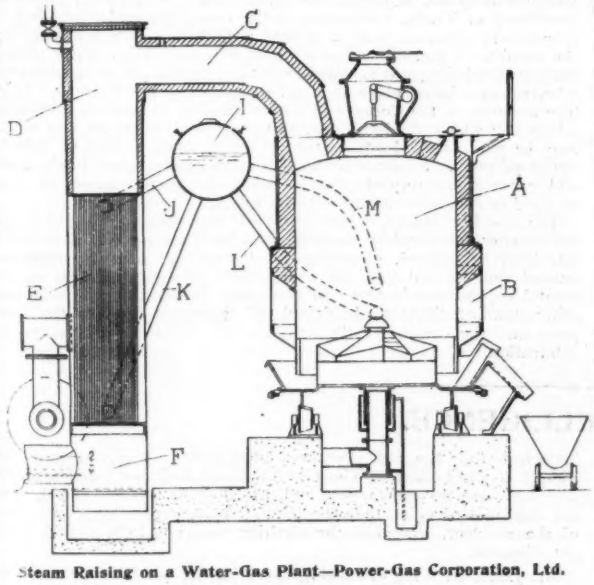
Steam Raising on Gas-Making Plant.—No. 290,070.

POWER-GAS CORPORATION, LTD., and RAMBUSH, N. E., both of Stockton-on-Tees.

No. 19,253; July 20, 1927.

The patentees have found that it is very advantageous to combine the waste-heat boiler and the annular water jacket surrounding the fuel bed of a gas producer or a water-gas generator, in such a way that the waste-heat boiler and the annular boiler have a common steam drum or steam space; the water being circulated between the steam drum and the waste-heat boiler and the annular boiler respectively.

We reproduce a drawing showing one method of carrying this out. A represents a producer or water-gas generator provided with an



Steam Raising on a Water-Gas Plant—Power-Gas Corporation, Ltd.

annular water jacket B. The gases leave the generator by a pipe C, and enter the collecting chamber D of a vertical boiler E, passing downwards through the tubes thereof, and issuing via the bottom collecting-chamber F. (It is not essential to the invention that the generator gases should pass downwards through the vertical boiler, but it is preferred to adopt this direction since the hottest gases then give up their heat and cause ebullition of water at a depth which is sufficiently small to avoid "bumping.")

The water space of the boiler communicates with a steam drum I by means of the circulating pipes J and K, and the same steam drum I is connected to the water jacket B on the generator by circulating pipes L and M. The provision of this double set of circulating tubes enables natural circulation to be set up both in the boiler E and in the water jacket B. As the primary function of the water jacket B is to cool the lower part of the generator, the rate of water circulation therein may be enhanced by artificial means such as hydro-kineters —*i.e.*, steam jets or the like which propel the water through the tubes L and M.

Dry Meters.—No. 290,419.

SIMPSON, S., of Exmouth.

No. 9423; April 6, 1927.

This invention relates to dry gas meters, and has for its object to provide an improved arrangement and construction of the crank and connecting rod mechanism operating the slide valves of the meter, whereby friction is reduced, the wearing surfaces are increased in area, and the connecting rods are more easily assembled. According to the invention the ends of the connecting rods which are required to engage the crank pin are provided of relatively large diameter in comparison with the diameter of the crank pin, and are bored to an internal diameter such that they may be readily assembled in position by being passed over one of the webs of the crank; the required working disposition in relation to the crank pin being determined by means of a bearing bush adapted to fit the inner bore of the connecting rod ends, and to bear upon the crank pin surface. The bearing bush is divided axially, and at least one of the webs of the crank provided is of such form that, after the connecting rods have been assembled in position, the bearing bush may be fitted by the introduction of the parts separately into the annular space which is provided within the connecting rod ends around the crank pin. The parts of the bearing bush may be adapted to be secured together after assembly.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for June 13.]

Nos. 16,190—16,834.

BRONN, J. I.—"Separation of bye-products, &c., from coke oven gases." No. 16,801.

DUCKHAM, Sir A. M.—"Carbonizing chambers." No. 16,793.

FISCHER, G.—See Bronn, J. I. No. 16,801.

GAS METER COMPANY, LTD.—"Gas or electric controllers." No. 16,810.

INTERNATIONAL COMBUSTION, LTD.—"Apparatus for carbonizing and distilling material." No. 16,693.

KING, W. E.—See Gas Meter Company, Ltd. No. 16,810.

MACHIN, J. E.—"Gas vaporizer." No. 16,522.

MASCHINENFABRIK AUGSBURG-NURNBERG AKT.-GES.—"Sealing gasholders." No. 16,714.

PINTSCH & DR. OTTO GES.—"Heating-walls of vertical chamber ovens." No. 16,488.

WOODALL-DUCKHAM (1920), LTD.—See Duckham, Sir A. M. No. 16,793.

[Extracted from the "Official Journal" for June 20.]

Nos. 16,835—17,526.

BRAACH P.—"Utilization of hot gases in gas stoves." No. 17,025.

BUNDGENS, F. and L.—"Gas radiators." No. 17,180.

CONTINUOUS COAL CARBONISATION, LTD.—"Carbonization of coal." Nos. 17,165, 17,166, 17,167, 17,168, 17,169, 17,170.

GADD, A.—"Gasholders." No. 16,963.

GIBB, D. M.—"Gas heated ovens." No. 17,389.

HARBORD, A. E.—"Gas fires." No. 16,860.

LAST, J.—"Means recording meter readings." No. 17,278.

MURRELL, W. A.—"Gas meters." No. 17,227.

NISBET, R.—See Continuous Coal Carbonisation, Ltd. Nos. 17,165, 17,166, 17,167, 17,168, 17,169, 17,170.

OLSSON, A. H.—"Alarm apparatus for prevention of gas poisoning." No. 16,883.

PARKINSON STOVE COMPANY, LTD.—See Gibb, D. M. No. 17,389.

PEEBLES, W. C., and PEEBLES & CO., LTD.—Stuffing-box for gas meter spindles. No. 17,306.

PETERSON, P. D.—See Olsson, A. H. No. 16,883.

RADIATION, LTD.—Gas heated cooking ovens. No. 17,490.

ROSENBERGER, H.—See Braach P. No. 17,025.

SHADBOLT, F.—"Purification of coal gas." No. 17,008.

WINZER, C. B.—See Continuous Coal Carbonisation, Ltd. Nos. 17,165, 17,166, 17,167, 17,168, 17,169, 17,170.

YATES, H. J.—See Radiation, Ltd. No. 17,490.

London's oldest lamp-posts are being restored. There are ten of them, of wrought iron, with some very beautiful moulding; and they are to be found opposite Cornwall Terrace, Regent's Park. Their restoration is due to the enthusiasm of an artist whose home is close by. In future the lamp-posts will be kept in a state of preservation, and will, says the "Daily Telegraph," probably be included in "Ancient Monuments."

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

Progress of Bills.

Dover Gas Bill: Reported, with amendments.

Hinckley, Ormskirk District, Southend-on-Sea and District, and Weston-super-Mare Gas Orders: Approved.

Rotherham Corporation Bill: Brought from the Commons; read the first time and second time, and committed.

South Suburban Gas Bill: Brought from the Commons, read the first time, and referred to the Examiners.

Windermere Gas and Water Bill: Read the second time, and committed; reported, with amendments.

York Town and Blackwater Gas and Electricity Bill: Returned from the Commons, agreed to, with amendments, which were considered and approved.

HOUSE OF COMMONS.

Progress of Bills.

Bournemouth Gas and Water and Tottenham and District Gas Bills: Read a second time, and committed.

Dover Gas Bill: Read the first time, and referred to the Examiners.

South Suburban Gas Bill: As amended, considered; amendments made; read the third time, and passed.

York Town and Blackwater Gas and Electricity Bill: As amended, considered; read the third time, and passed, with amendments.

Scientific Treatment of Coal.

On Thursday, June 21, the House went into Committee of Supply for consideration of a sum of £110,319 to complete the vote for Mines Department of the Board of Trade. Commodore King (Secretary for Mines) gave a review of the work of the Department.

In the course of a lengthy debate, Mr. Hall urged the Secretary of Mines to take up the question of the scientific treatment of coal more thoroughly. Science, he said, had proved conclusively that oil could be extracted from coal. He recently saw in one of the mining journals a report of twelve different processes of oil extraction; and by those twelve processes, from one ton of coal an average of from 15 to 25 gallons of oil could be extracted, a certain amount of motor spirit, from 3000 to 5000 c.ft. of gas, and from 12 to 14 cwt. of smokeless fuel. Ought not, he added, a process of this kind to be encouraged more than it was at the present time by the Government or by the Mines Department? He had seen some of the works where pulverized fuel had been tried, and it appeared to be working quite satisfactorily. There was very little encouragement in this country for the development of the scientific use of coal—nothing like as much encouragement as was given to this work in Germany or even in America. They were told by some of the experts in America that the report of the Giant Power Survey of Pennsylvania stated that out of 50,000,000 tons of a typical bituminous coal, there could be extracted, by low-temperature methods, from 38 to 40 million tons of smokeless fuel, 250 million gallons of fuel oil, 250 million gallons of creosoting and disinfectant oils, and 500 million gallons of tar oils suitable for fuel oil and as a base for the chemical industry.

Concluding his interesting speech, Mr. Hall asked if the position of power production generally in this country was realized. There was no other commodity that was nearly as valuable as coal, because all power produced in this country was produced from coal. They saw, he said, the gas industry introduced and developed, in the first instance, for the purpose of artificial illumination. The gas industry was now developing and taking over some of the functions which were formerly done by coal, and it was dependent on the mining industry, using between 17 and 18 million tons of coal. The more the gas industry developed, the more coal was being used. Then they saw the electrical industry developing, again mainly for the purpose of artificial illumination. This was a third industry which was now developing into a great power-producing industry. Of the three industries, coal, gas, and electricity, the latter two industries were absolutely dependent upon the other industry, and yet the two industries had been allowed to develop quite separate and apart from the coal mining industry. Now there was another new industry developing in this country. This was the scientific treatment of coal, or oil extraction from coal; but from what could be seen this new industry was going also to be quite separate and apart from the mining industry. When were they going to settle down and co-ordinate power production? They argued that if the mining industry was properly worked and organized, they could so co-ordinate power production in this country that they could bring these four great industries into one industry, reduce a considerable amount of wastage that was going on at the present time, and produce power sufficient to keep this country the great industrial nation that it had been.

WINDERMERE DISTRICT GAS AND WATER BILL.

The Bill promoted by the Windermere District Gas and Water Company was considered by the Unopposed Bills Committee of the House of Lords on Tuesday, June 19, and was ordered to be reported for third reading. It has already passed through the House of Commons. Its main purposes, so far as the gas part of the undertaking is concerned, are to establish the thermal basis of charge and to fix the standard price and dividend. There are also powers for increasing capital. [See "JOURNAL" for Feb. 1, p. 269.] In the House of Commons a clause was inserted giving the Windermere Urban District Council an opportunity to purchase the Company's undertaking by promoting a Bill in Parliament next session.

DOVER GAS BILL.

The Bill promoted by the Dover Gas Company, which contains provisions for the conversion of capital, and the application of the basic price and dividend principle, was considered by the Unopposed Bills Committee of the House of Lords on Tuesday, June 12. The application of the basic principle to the Dover Company and the South Suburban Gas Company was referred recently to a joint Committee of both Houses of Parliament, which Committee decided in favour of its application (see "JOURNAL" for May 23, p. 545).

One or two additions and alterations have been made to the Dover Company's Bill as originally drafted (and as indicated in the "JOURNAL" for Jan. 11, p. 91). In the first place, there is a new clause providing that the provisions as to price of gas and application of profits are to come into force on Jan. 1, 1929.

The original provisions as to the conversion of stock remain. The clause making special provision for the benefit of small investors has been amended, and now provides that a proportion, up to one-fourth, of each future issue of capital, may be reserved for exclusive offer to the Company's employees and consumers. The original proposal, that such stock may be reserved also for offer to "others of the like class within the limits of supply," has been deleted. The clause has also been amended to provide that such shares or stock shall be allotted at not less than the reserve price at which the other shares or stock of the same issue shall be offered.

There is also a new clause providing for the priority of existing mortgages over those granted under the present Bill.

The basic price in the inner part of the Company's area of supply is to be 13d. per therm. In the outer area it is to be 2d. per therm in excess of that in the inner area. The Board of Trade has power to revise the basic price at any time after three years from Jan. 1, 1929 (instead of five years, as originally provided).

Surplus profits are to be distributed in the proportions of three-quarters to consumers, and one-quarter between the ordinary shareholders and the employee co-partners. (The proportions originally proposed were two-thirds and one-third respectively.) There is a new provision, that no sum in excess of basic dividend shall be applied to the benefit of the holders of ordinary capital unless the price charged for gas is less than 12d. per therm throughout the inner area.

By other new clauses the Company is to file for public inspection with the local authorities in the area, from time to time, and with the Board of Trade, statements of the conditions under which it is prepared to grant discounts; to send each year a statement showing the number of therms sold at each of the several net prices during the year (including gas supplied to public lamps); and to furnish such other relevant information as may be required by the Board of Trade. The accounts of the Company for each year are to contain particulars which will enable the local authorities to calculate the amount which may be paid as dividends or transferred to reserve fund or paid to the co-partners. Separate particulars of the gas supplied in the inner and outer areas respectively, including the excess price (if any) charged in the outer area, are to be given.

The stand-by clause, which proposed a minimum charge of 25s. per quarter for stand-by supplies, has been deleted. A new clause has been substituted, providing for the charge of such minimum annual sum as will give the Company a reasonable return on the capital expenditure incurred in providing the supply and will cover other standing charges. In default of agreement between the Company and the consumer, the sum payable is to be determined by arbitration.

LEGAL INTELLIGENCE.

LEGAL RESPONSIBILITY FOR GAS-WORKS FATALITY.

Lengthy legal arguments as to responsibility in connection with a man who was injured on new gas-works plant under construction occupied the Skipton Magistrates on Saturday, June 23, in a case in which the Earby and Thornton Gas and Lighting Company were summoned for an alleged breach of the Factory Act regulations. The matter arose out of an accident to Frank S. Keats, who, on March 14, while examining shafting at the gas-works, was caught by a part which, it was suggested, was not properly fenced, and was whirled round, receiving injuries from which he died.

Keats was supervising engineer in the employ of West's Gas Improvement Company, of Manchester, who had installed the new retort house plant. The defence of the Gas Company was that the man was in the employ of the contractors, and that the accident happened while the new plant was being given a trial run under the control of the builders. The Gas Company had not taken over the premises from the contractors, and, therefore, it was contended, were not the legal occupiers nor the party legally responsible. The facts of the accident, and that the shafting was not fully fenced, were not disputed.

Mr. James E. Wing (Sheffield), appearing for the Director of Public Prosecutions, submitted that there was no doubt the Gas Company were responsible. The notice of the accident, required to be given by the occupier, was given by that Gas Company, and the accident was formally entered in the register of the Company, in which the Company's name was given as the occupier of the works.

After hearing witnesses on both sides, the Magistrates reserved their decision.

MISCELLANEOUS NEWS.

SOUTH METROPOLITAN GAS COMPANY'S CO-PARTNERSHIP.

Address by Dr. Charles Carpenter.

Last Saturday afternoon, in glorious summer weather, the South Metropolitan Gas Company held their annual co-partnership festival at the Crystal Palace, when co-partners with their wives and friends, to the number of many thousands, enjoyed a well-arranged programme. As usual, the afternoon was devoted to a sports meeting, in the course of which the remarkably fit condition of the Company's employees was amply demonstrated. Once more Mr. A. Coleman proved himself to be absolutely the man to undertake the duties of Organizing Secretary. Mr. F. Day officiated as Referee on the sports ground; and Mr. C. Walker, for the swimming races in the boating lake. At the conclusion of the sports tea was served; and this was followed by the co-partnership meeting in the centre transept.

Dr. Charles Carpenter, C.B.E. (the President of the Company), was in the chair; and he was supported by the Vice-President (Mr. Frank H. Jones) and other members of the Board, as well as by the principal officers. There was some community singing, conducted by Mr. Thomas P. Ratcliff; and then Dr. Carpenter delivered the following address.

THE ADDRESS.

Dr. CHARLES CARPENTER: Co-partners all, ladies, and gentlemen,—It is now approaching half-a-century since the then Chairman of this Company conceived the idea of interesting its employees in its affairs, and of sharing with them its rewards. Like many other novel proposals, this one met with great opposition from various quarters; organized Labour and unorganized Capital being alike sceptical of its desirability. It was, however, eventually put into operation nearly forty years ago under circumstances of great difficulty, and accompanied by a heavy financial loss. Its progress was slow; and it was not until five years after its inception that our neighbours the South Suburban Gas Company adopted the principle; while twenty years were to pass before the co-partnership ranks of the Metropolitan Gas Companies were closed by the entry therein of the Gas Light and Coke Company. To-day something like fifty gas undertakings throughout the land are working under principles similar to those put forward by us in 1889. But more significant still is their spread to many other industries up and down the country, where they have been adopted more or less completely in nearly three hundred cases.

NEW SPIRIT IN INDUSTRY.

Perhaps the disappointments succeeding the great war, and the failure of the industrial conflicts following in its trail, have been responsible for the endeavours being made in many quarters to-day to seek in co-partnership relief from the troubles which for so long have beset the relations of Capital and Labour. Indeed, the new spirit in industry about which we now read so much does appear to be entering the hearts of those leaders who, but a few years since, scouted the idea that peace could ever be possible between the two armies into which industry was divided, and in the ranks of one of which they served. Only a few days ago a prominent leader of militant trade unionism in the Antipodes announced his abandonment of the extremist campaign, and his advocacy, in substitution, of endeavours to secure by goodwill an industrial peace. It is curious how long it has taken to bring to this way of thinking the minds of many of those who, while expressing disapproval of warfare as between nations, did not hesitate to urge its adoption between brethren—a sword for use at home, and an olive branch to be carried abroad.

LOOKING BACK.

Let me, this afternoon, ladies and gentlemen, occupy a few minutes of your time by looking back over those forty years which have elapsed since the great dock strike shook to its foundation the industrial life of the Metropolis. It has been truly said, "Peace hath its victories no less renowned than war's." What blessings, then, has industrial peace brought to the employees of this Company—blessings that must perforce have been, and are to-day, shared by those nearest and dearest to their hearts?

THE MONETARY ASPECT.

Let me begin with the most material fact. During the forty years of which I have spoken, no less a sum than £1,160,000 has been distributed by this Company as bonus additions to wages, the highest annual figure being that of £82,624 distributed last year. In addition to that, £34,809 was paid as dividends upon the employees' holding of stock, making together for 1927 a total of £117,433. Large though that figure is, it is not to the financial result that I attach the greatest importance in reviewing what has been created by co-partnership conditions of working. There has, I truly believe, grown up among those carrying on the business of the Company an animating spirit unlike that too often met with in the industrial world.

SPIRIT OF CO-PARTNERSHIP.

We meet together and discuss those difficulties and anxieties which from time to time beset us, whether originating from without or from within. We are ever ready to seek means of improving working conditions, of lightening labour wherever possible, and of carrying it on under more healthful environment. We have, moreover, a splendid organization continuously improving those precautions upon which our employees so largely depend for the security of their life and limb. We have a medical service whose function is not only to give thought to the sick, but to help the healthy by keeping a watchful eye lest any particular occupation should develop liability to special ailments or disease. Holidays with pay are given annually to all, as they have been by us from, I was going to say, time immemorial, while working hours allow ample margin not only for recreation, but for the acquisition and extension of useful knowledge. We have our own funds for unemployment, for sickness, and for provision for old age; and, lastly, we have at Mundesley-on-Sea our own memorial to those who fell in the great war, where many of the tired and worn have found in health-giving surroundings, aided by skilled doctoring and sympathetic nursing, a renewal of their energy and vigour.

When I look back over that more than half-a-century which has elapsed since I first entered the Company's service, I see a condition of things where none of what I have been describing to you existed. All of them have grown up and been developed by stimulation from within, and not through pressure from without; and I think I am justified, therefore, in regarding them as being, in their nature, victories for peace, and of which co-partnership is but another expression.

CAPITAL'S PART.

So much for one side of the picture. What of the other? To whom do we owe these blessings of which we have all partaken, and which we all share? Firstly, to what is called Capital; to those who, having money inherited, earned, or saved—I care not which—had faith in our proposals, supported them when, in the first instance, we commenced operations in South London, and from time to time backed their faith by fresh contributions when the needs of our expanding business required financial assistance which has ever been forthcoming. We should have fared very badly had Capital not stood by us, as it has done, throughout our century of existence.

INDEBTEDNESS TO THE PUBLIC.

But it is the public we serve to whom we owe most. Week by week it pays your wages and the colliery coal bills, and enables us thereby to maintain an efficient service of what is agreed upon all sides to be one of the great necessities of life. But please remember that you are something more than recipients of a weekly or monthly wage. It is as partners in a great undertaking that you share the advantages I have been enumerating. The test the public will apply is one only—the cheapness and efficiency of their gas supply. Not one of our co-partners can escape his responsibilities in that respect. He is profiting by the conditions of co-partnership employment. He must take with every other employee or official his share of responsibility, to see that there is the fullest economy of production, the most useful employment of time and material, and exercise mind and hand alike in efficient labour, if the requisite standard demanded by to-day's competition is to be reached.

The thousands of heads of families who to-day constitute the mass of our co-partners have entered into a great, I think I may say an ennobling, heritage—that of working in a useful sphere of human activity. From the Prime Minister downwards, what more can be asked than that we may employ those abilities that have been given us in the service of our fellows by, we may truly say, brightening and lightening their daily lives?

It has been sometimes said of us by our critics: "You co-partners are a little clique of your own," and that we have thereby placed ourselves outside what they call the general labour movement. But it is from so-called little cliques that all great reforms have developed; and as certainly as I stand here to-day am I sure that it is by the adoption of co-partnership principles, and by those alone, that just as it has for so long symbolized liberty and freedom, so this England of ours will send forth to the nations of the world its message of industrial peace, as fresh rays from "a precious stone set in a silver sea."

The presentation of prizes to the successful competitors was succeeded by a charming display of Swedish drill and special dancing, under the direction of Mr. A. Coleman and Miss N. Webber, which again afforded proof of the fitness of the Company's employees of both sexes, as well as of the training ability of the instructor and instructress. Music was by the South Metropolitan Gas Company's Military Band, conducted by Mr. Sydney Herbert. The day's proceedings were brought to a close in the centre transept with a dance programme by the Company's Co-Partnership Orchestra.

GAS REGULATION ACT APPLICATIONS.

SPECIAL ORDER.

Bristol Gas Company.

To authorize the Company to use scheduled lands for gas purposes, and to maintain and use any mains, pipes, and other works acquired by them from the Liquidators of the Keynsham Gas Company, Ltd.

DECLARATION OF CALORIFIC VALUE.

Southend-on-Sea and District Gas Company.—450 B.Th.U. (Sept. 22.)

PLYMOUTH AND STONEHOUSE GAS COMPANY.

A Satisfactory Position.

At the Annual Meeting of the proprietors of the Plymouth and Stonehouse Gas Light and Coke Company on June 19, a very satisfactory state of affairs was again reported.

The CHAIRMAN AND MANAGING DIRECTOR (Mr. J. H. Ellis), presenting the report to a large meeting of co-partners and shareholders, said he believed it would be satisfactory to the town because the price of gas had been reduced to the pre-coal stoppage price (6½d. per therm), and to the co-partners because they had been able to recommend the pre-coal stoppage rate of bonus and interest of £7 17s. 6d. p.ct. They had, indeed, retained the whole of the largely increased business which the coal stoppage brought them, and had secured a big volume of additional consumers as well. The capital account showed, as did all the figures, that they had steadily and consistently husbanded their resources. On the revenue account, the total debits were £274,605, a decrease of £9270; and the total credits, £316,395, a decrease of £2269—the balance being £41,790, an increase of £7001. In the year ended March 31, 73,349 tons of coal had been carbonized, as against 63,801 tons in the previous year. In 1927-28, 1245,104 gallons of oil were used, against 1,481,397 gallons in 1926-27. The principal items on the credit side were: Sale of gas, £239,526, a decrease of £6226; coke, £28,130, an increase of £3412; and tar, £21,954, an increase of £3928. At first sight the decrease from sales of gas looked bad, but as a matter of fact it was extremely good, for they had sold more gas at a reduced price. After crediting profit and loss account with the balance of £41,790 on revenue account, and providing for dividends and interest, there remained to be carried forward £29,919, as compared with £28,212, an increase of £1707. He had taken out the yield of gas per ton of coal made in the vertical retorts since they came into regular use last November to the present time, and found the average yield had been 16,595 c.ft. For the corresponding period 1924-25, when the horizontal retorts were in use, the yield was 12,597 c.ft. per ton, or 4000 c.ft. less than they were now getting. So far as appearances and his information went, they were not likely to have any substantial increase in the price of coal, notwithstanding the Five Counties pooling scheme, which, he understood, was an effort by certain coal-owners to make more profits by keeping the price of coal up to their fellow countrymen, in order to sell it cheap to the foreigner. They naturally watched these movements with care, and they might influence their buying; but they occasioned them no anxiety. The market prices of the raw materials were governed by causes largely beyond their control; but they were fully prepared in case they rose, and equally ready to take advantage of them if they fell. Indeed, they were better prepared than ever before, because their works and plant were more flexible and adaptable, and they were accordingly less dependent upon market fluctuations.

The profit earning capacity of the works had considerably increased by their recent expenditure; and the choice of coal, formerly practically limited to the Durham coalfield, had been extended. If the results they were now securing were maintained—and he knew no reason why they should not be—there were some good times ahead. Their business had increased in every department but one, and that by no means of first importance. At present the domestic was their main sphere of influence; and what they had done was truly remarkable. They had in use upwards of 34,000 gas cookers; in fact, more than 90 p.ct. of the cooking in Plymouth was done by gas. How rapidly the raw coal fire was disappearing owing to partiality for their cheaper, cleaner, and more convenient commodity was shown by the fact that they had 2962 more fires in use than they had last year.

The adoption of the report and accounts was carried; and it was decided to pay dividends for the half-year of £7 17s. 6d. p.ct. per annum on the ordinary stock, 13s. 3d. per share on the additional shares, and 12s. 9d. per share on the new shares, Act 1879, less income-tax. This would leave £13,321 to be carried to the next account. It was also agreed to pay the same dividend in January next.

Mr. P. S. Hoyte to Retire.

The CHAIRMAN, in the course of the proceedings, said: I must thank Mr. Hoyte, Mr. Bolton, and the whole of the staff, without exception, for the way they have helped my colleagues and myself in our efforts to serve you. With regard to Mr. Hoyte, on every occasion on which I have addressed you it has been my pleasure to refer to his ability, his industry, and his zeal in the Company's service. He has a high, and deservedly high, place among his professional brethren; and his heart is in his work. He has served the Company for more than a quarter-of-a-century; and long before I became connected with the Company I had the pleasure of knowing him, and I am aware of the regard my predecessor, Sir Joseph Bellamy, had for him. Much of his useful constructive work was done before the great war. It was during the war that I became associated with him. His work for us in that trying time was of the greatest value, as were also his national services in regard to high explosives—as Lord Moulton testified. You know how strenuous a time he has gone through since. You have seen the magnitude and variety of the works he has designed and carried out. I have to acknowledge with gratitude his help in dealing with the difficulties which have from time to time confronted us, and the skill he has shown, and the exertions he has made, in bringing the Company to its present proud position.

Now our friend Mr. Hoyte proposes to retire from the post of Engineer. We have made an arrangement with him whereby, while releasing him from the daily grind of his engineering and administrative duties, we secure the benefit of his advice and help as Consulting Engineer, at any rate until his right to superannuation accrues. That is secured to us by agreement. But wholly apart from agreement, Mr. Hoyte, as you would have expected of him, has volunteered to help his successor and us in every way he can. The time and manner of these administrative changes leave nothing to be desired. Mr. Hoyte drops some of his active work at a time when, so far as we can see, there are no grave difficulties ahead. He is not a man who would be deterred from facing them if they existed. The time of parting is not yet. He remains in our service, and will be with us next year in his official capacity of Consulting Engineer. He is one of our largest shareholders, and we look forward with pleasure to his continued association with us. When the parting comes, should it come in my time, I hope we shall have a special meeting to recognize more formally than I did just now his long and distinguished service.

Mr. Clark will succeed Mr. Hoyte as Engineer. [Applause.] That shows in one particular instance we have done the right thing. They have worked harmoniously and well together, and will continue to do so. We promote an excellent servant who knows Plymouth and its requirements, who has grown up, so to speak, with Mr. Hoyte. There will be no change of policy. The arrangement gives a valued servant relief from some of the onerous duties he has hitherto performed, and the terms agreed on recognize the length of his service and the merit of his work. I feel sure Mr. Clark's appointment is the best that could be made. It is part of our policy to encourage our staff by promoting the deserving; and Mr. Clark is deserving, and qualified scientificaly and practically for the job. I think Mr. Hoyte would like to have an opportunity of saying a few words to his old friends.

Mr. P. S. HOYTE: I think that, with the possible exception of our revered Deputy-Chairman, Mr. Greek Wills, I have attended more annual meetings of the Company than any other present here; but this is the very first time I have been called upon to speak. I want, in the first place, Mr. Chairman, to thank you for the very eloquent and kindly way in which you have referred to my past services with the Company. I have spent by far the greater part of my life in Plymouth. I have been here now 34 years, and have had the pleasure of being Chief Engineer for 28 years. I want also, in the presence of the older shareholders, to thank that new but much larger body of shareholders, our staff and workmen, who are now, with them, the part proprietors in this Company. From you, ever since I came to Plymouth—I speak of every department, the staff and the men—I have received nothing but kindness. I have never made a request, of all the thousands I have had to make in my official capacity, that you have not complied with willingly and smilingly. The Chairman has referred to my considerable holding in the Company. I may say that, apart from the house that I live in, practically all the money I have been able to save has been invested in the Plymouth Gas Company. I will tell you why. I know a little about the Company—I ought to; and I believe that the stock of the Plymouth Gas Company is one of those very few baskets in which it is safe to put all your eggs. In a few days' time you will be receiving your half-yearly co-partner dividends; and it is my strong advice to you to do as I always do—invest it in the Plymouth Gas Company. What could be better? You are living on your own farm; you are living by your own farm. When you do a good turn for the Company, you are doing it for yourself. Now, before I sit down, I have one more request to make, and that is that you will give to the man who is taking my place—my valued assistant, Mr. Clark—the same support, the same help and willingness that you have given me. He is no newcomer here. You know him probably nearly as well as you do me; and I feel sure that my request will be granted, and that you will give him the same friendship and help that you have given me.

LUXURY VILLAS.

New Style of Work-Saving House.

Villas designed on "sunshine-saving" and work-reducing lines are being erected at New Barnet, on the Hertfordshire-Middlesex border. These houses are attracting attention by reason of their claim to exceptionally sound construction; but they offer a further inducement in the variety and character of the fittings and fixtures with which they are equipped.

Provided with a garage and a large garden, the houses contain a lounge hall, two reception rooms, four bedrooms, a kitchenette, and bathroom. Doors and window-frames are of well-seasoned wood, and there is an entire absence of metal "furniture" of the kind that requires polishing. The bedrooms are provided with lavatory basins of porcelain, and taps of the same material or stainless steel, and the kitchen with a porcelain sink. The latter apartment also contains a cabinet dresser with glass doors, an elevated gas cooking range of the latest type, fitted with a "regulo" heat control, an independent boiler for a continuous hot water service throughout the house, a gas copper, and a tiled larder. The gas appliances are the manufactures of Messrs. John Wright & Co., of Birmingham (Radiation, Ltd., Proprietors).

Gas fires of the injector-ventilator pattern, made by Radiation, Ltd., are installed in the dining room, three of the bedrooms, and the hall, and the heating service is augmented by the installation of two radiators. An additional convenience has been supplied in the shape of a hot towel-rail in the bath-room, which is kept continuously heated by the boiler. Lighting is by electricity; and extra points are available for vacuum cleaner and laundry irons.

The houses are being sold at £1500 and £1875 leasehold, and are intended for occupiers to whom quality rather than price is the chief consideration.

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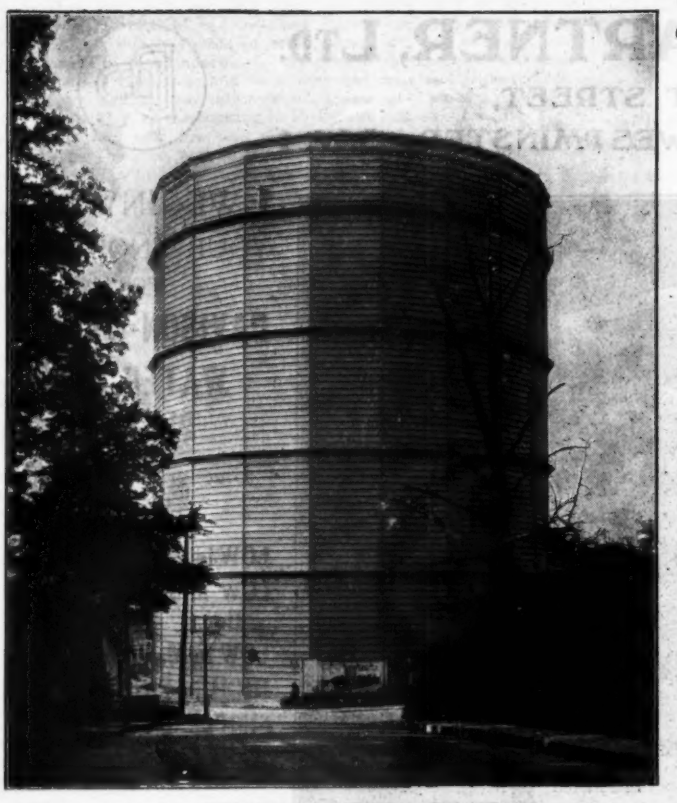

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MANCHESTER GAS DEPARTMENT REPORT.

The Gas Committee of the Manchester Corporation have submitted to the City Council their report for the year ended March 31, together with an abstract of the accounts.

The following is a summary of the items of income and expenditure; the figures for the previous year being also given for the purpose of comparison.

1927.			1928.	
£	£	INCOME.	£	£
	1,324,640	Gas, &c.		1,352,549
		Residuals—		
329,455		Coke	185,733	
121,943		Tar	99,773	
12,219		Sulphate of ammonia	15,803	
	463,617			301,309
	1,942	Sundry receipts		1,925
	1,790,199			1,655,783
		EXPENDITURE.		
		Manufacture—		
943,618		Coal and oil	451,530	
		Carbonizing wages, maintenance of plant, &c.	205,256	
238,920				
45,065		Provision for renewals	45,153	
	1,227,603			701,939
		Distribution—		
		Maintenance of plant, salaries and wages, &c.	183,629	
174,997				
77,489		Provision for renewals	81,983	
	252,486			265,612
	92,911	Rents, rates, &c.		90,364
		Management, collection, &c.—		
36,930		Salaries and wages	37,179	
		Less—Receivable from Electricity Committee for collection of accounts	*5,900*	
6,053				
30,877			31,279	
60,852		Other charges	52,602	
	91,729			83,881
	1,664,729			1,141,796
	125,470	Gross profit for the year		513,987
114,136		*Less*—Interest on loans, &c.	123,866	
11,156		Income-tax	1,852	
	125,292			125,718
	178	Net profit		388,269

The net profit has been applied in meeting the adverse balance of £149,308 on the previous year's appropriation account, attributable to the coal stoppage; and the balance of £238,959 has been appropriated as follows:

1927.		1928.
£		£
128,442	Sinking fund for redemption of loan debt	155,714
23,622	Applied in extension of works where borrowing powers are not granted	26,190
	Provision for—	
..	Working capital fund	40,000
..	General reserve fund	11,546
152,064		233,450
Deficit, &c. 151,886	Carried forward to next year's account	5,510
£178		£238,960

The quantity of gas sold was 7073 million c.ft.—a decrease of 1·84 p.ct. as compared with the previous year, which is accounted for by the abnormal consumption for that year consequent upon the coal shortage. The average price realized was 3s. 8·7d. per 1000 c.ft. (equivalent to 9·93d. per therm) as compared with 3s. 7·07d. (9·57d. per therm) for the previous year. The Committtee were faced at the commencement of the financial year with an adverse balance on the net revenue appropriation account of £149,309 consequent upon the coal stoppage. It was necessary, therefore, to maintain the price of gas at the higher figure then in force until such balance was liquidated. The necessary sum was realized by the end of the September quarter, from which date the price was reduced generally by 7d. per 1000 c.ft. (1·56d. per therm).

The demand for cookers and other consuming appliances continues to be satisfactory. The number of approved applications to be placed on the reduced scale of prices applicable to gas used for manufacturing, &c., purposes, received up to March 31 last, was 2148, in respect of which the consumption was 1110 million c.ft., or 15·7 p.ct. of the total sales.

The cost of coal and oil carbonized was as follows:

—	Gross Cost.	Less Income from Residuals.	Net Cost.
	s. d.	s. d.	s. d.
Last year, per 1000 c.ft. sold	1 3·32	0 10·22	0 5·10
Previous year ,, ,,	2 7·43	1 3·44	1 3·99

The difference represents a decrease in net cost to the Committee of £320,950, due wholly to the heavy costs for the previous year consequent upon the coal stoppage. The average gross cost of coal only, inclusive of cost of handling, was 19s. 2·61d. per ton, as compared with 40s. 11·07d. for the previous year. There has been a considerable reduction in the income from residuals, which, of course, is attributable to the abnormal yield obtained during the coal stoppage of the previous year.

After meeting all outlay under renewals account, there is a balance to the credit of the account of £172,364. The amount transferred from revenue account was £128,459, which, together with the interest on the fund amounting to £5164, gave a total credit for the year of £133,623. The amount expended during the year was £133,381.

Additional loan capital has been raised to the extent of £249,290 for the Partington Works. The expenditure for the year amounts to £288,356, of which sum £26,190 has been provided out of revenue and the balance out of loans. The total capital outlay at March 31 was £5,904,841, the loan debt in respect of which, after allowing for sinking fund not applied to repayment of debt, was £2,330,923, or 39·47 p.ct.

Further contracts amounting to £26,000 have been entered into during the year for plant and workmen's houses at the Partington Works.

The balance of the sinking fund unapplied at the commencement of the year was £71,838, and the amount provided out of revenue for the year £155,713. Loan debt to the extent of £160,842 has been redeemed, leaving a balance of £66,709 not actually applied to the redemption of debt. The total borrowing powers of the Department amount to £6,623,447, in respect of which loan capital has been raised to the extent of £5,553,227.

The Committee regret to have to record that a serious accident and consequent fire occurred at the Bradford Road Gas-Works on Aug. 23, 1927, a result of which was that two gasholders were badly damaged. No serious injury was caused to any person, and apart from the holders there was only slight damage to property either on the works or in the neighbourhood. The cause of the accident is unknown, despite the fact that a most searching investigation has been made and a public inquiry held by a Government Inspector acting under the instructions of the Home Secretary. No report on the inquiry has yet been received from the Home Office.

DUNDEE GAS DEPARTMENT.

Working Results in 1927-28.—Reduction in Price of Gas.

The statement of the Gas Convener at a meeting of the Dundee Gas Department on June 8 shows that the year just ended has been in many respects a satisfactory one—not the least satisfactory item being the financial aspect, which exhibits a surplus of £24,290. The deficit of £32,894, which the undertaking had to meet after the coal stoppage of 1926, is thereby reduced to £8604. In a constructional sense the year has been a particularly busy one. New purifiers of the most modern form have been installed, capable of dealing with 5 million c.ft. of gas a day; and a waste-heat boiler has recently been added, which is producing 10,000 lbs. of steam per hour from the surplus heat passing up the chimney of two benches of vertical retorts.

The manufacture of the gas rose from 1764 million c.ft. to 1808 millions during the year—an increase of 44 million c.ft. Having regard to the abnormal increased consumption in the previous year, due to the coal stoppage, the further increase is gratifying. Consumers have increased by 1112; the respective figures being 55,950 and 54,838. Cooking and heating appliances on free loan or hire-purchase have increased by 1412 and 1089; the figures at the end of the year being 44,968 and 18,105. In addition to the foregoing there are 22,823 cooking and heating appliances, and 58 gas engines, in use owned privately by consumers.

Complaints arising from general defects in lighting have been dealt with to the number of 16,292, compared with 25,251 for the year previous—a reduction of 8959. Defective cooking and heating supplies dealt with totalled 9231, compared with 17,522 for the year previous—a reduction of 8291. It is not claimed that these large reductions are entirely due to the operation of the maintenance scheme, for the position is complicated through comparison being made with a period during which there was the coal stoppage; but there can be no doubt that the scheme is working towards a lasting improvement in the conditions under which gas is used, and is certain to contribute towards even better results in the immediate future.

The statement concludes with an expression of thanks to the Gas Engineer and Manager (Mr. James Dickson) and his staff for the satisfactory results of the past year.

It has been decided to reduce the price of gas by 4d. per 1000 c.ft., making the standard rate 3s.

Fuel Economy Exhibit at Manchester Exhibition.—Those who visit the Colliery and General Mining Exhibition to be held at the City Hall, Deansgate, Manchester, from July 10 to 21, and are paying particular attention to the subject of fuel economy, will find much to interest them on Stands Nos. 26 and 27, where the Turbine Furnace Company, Ltd., of 238B, Gray's Inn Road, W.C. 1, will have an attractive exhibit. The firm will be showing their well-known forced draught furnace, extension grate, and smoke baffle, fitted to a full-size Lancashire boiler front. Specimens of low-grade fuels in every-day use in the furnace will be available for inspection. It will be noted how it is possible with this furnace to consume small and powdery fuel without difficulty; the inclined firebars and troughs of diminishing area ensuring an equal draught from the steam jets in every part of the furnace and an even fire, free from "blowholes" and "deadpatches."

CO-PARTNERSHIP AT BRIGHTON.

The Seventh Annual Meeting of the employee co-partners of the Brighton and Hove General Gas Company took place on June 15—Mr. A. M. Paddon, M.Inst.C.E. (Chairman of Directors), persiding.

The Chairman said that during the past twelve months they had maintained steady progress. A sum of £3706 had been paid to the co-partners by allotment for the first half of 1927. The annual receipts now amounted to over £7000. He did not think the number of co-partners now was greatly in excess of what it was before, and therefore it meant there was a greater individual allotment. In regard to £3106 paid out of the fund, this embraced payments for things which were the legitimate object of co-partnership, such as giving to each co-partner when he retired on superannuation his share in the joint fund.

The Chairman proceeded to emphasize the importance to the members themselves of keeping their interest in the fund instead of drawing it out. Though the total funds shown on the balance-sheet were £46,274, in view of the fact that there was still another payment due to them since that account was struck, the amount really stood at over £50,000. The total amount of stock held by the trustees on Dec. 31 last was £27,670; but by reason of the issue of new capital, which under the powers available they were able to issue to the co-partnership movement, the total amount of stock held by the trustees was now nearly £58,000, and the trustees held about £11,000 in excess of the amount necessary to satisfy the full investment of all the co-partnership funds. The number of co-partners was 835 at the end of 1927, which was only 30 more than the original number.

The Chairman afterwards referred to the progress of the Co-Partners' Savings Bank, and the Co-Partnership Sick and Benefit Fund.

Sir Charles Morgan seconded the report and balance-sheet, which were unanimously adopted.

On the motion of Mr. R. A. Flegg, seconded by Mr. F. Mew, the Co-Partnership Committee and officers were heartily thanked. Mr. C. H. Rutter, the Engineer and General Manager, was associated with the vote, and great praise was given to Mr. E. P. Butcher, the able Co-Partnership Secretary.

On the motion of Mr. P. E. Browne (Distribution Engineer), the Chairman was enthusiastically thanked for presiding.

COAL TRADE REPORTS.

From Our Own Correspondents.

NORTH-EAST COAST.

The market is in a very dull and unsettled state, and trade, both for prompt and forward positions, is exceedingly quiet. The present week is regarded as a holiday season; the Exchange always closing for several half-days in what is known locally as "Race Week." Merchants and shippers usually make every effort to get business well forward, and, with the little trade that is passing at the present time, a very quiet week seems assured.

There has been a certain amount of export inquiry for gas coals, and a few small orders have been secured. But prompt demand is very slow, and more trade is required. Wear Specials are quoted at 15s. 6d. f.o.b., and best qualities 15s. Best seconds hold for 13s. 6d. to 13s. 9d., and others are 13s. to 13s. 3d. Coking coals have eased off; but fair orders have been booked in recent weeks, and best qualities are able to ask 13s. 6d. to 13s. 9d. Durham bunkers have eased, and best makes are 14s. 3d. to 14s. 9d., with seconds quoting 13s. 3d. to 13s. 6d. Coke remains firm, and gas makes are 19s. 6d. to 20s. f.o.b. for prompt, with 21s. to 22s. quoted for autumn and winter shipment.

Tonnage is scarce, and much shipping is laid-up owing to unremunerative freights. This has made the position difficult for the collieries, and there has been a good deal of idle time.

YORKSHIRE AND LANCASHIRE.

Gas coals have not quite maintained advances thought possible some months ago through reconstruction of the coal trade; but it is anticipated that there will be an alteration in this direction in the next few weeks.

Industrial fuel of the better grades has remained steady; but while smalls generally have not maintained prices which operated round about Whit week, there is a lack of coking coals which is causing some inconvenience to furnace coke producers. The latter commodity has been rather inclined to advance in consequence.

The export trade is improving under the subsidy scheme.

With the continued reduction of output, there is a fairly steady demand for domestic coal, although the situation has been rather spasmodic, and the cheaper qualities have received most consideration.

The following are the Humber bunker and export prices, f.o.b. usual shipping ports:

South Yorkshire—Hards, Association, 17s. 3d. to 17s. 6d. bunkers, 14s. 3d. to 14s. 6d. export; screened gas coal, 14s. to 15s. 6d. export; washed trebles, 15s. to 15s. 6d. export; washed doubles, 14s. to 14s. 3d. export; washed singles, 13s. 6d. to 14s. export; washed smalls, 12s. 3d. to 12s. 6d. bunkers, 10s. to 10s. 3d. export; rough slack, 11s. 6d. to 11s. 9d. bunkers; smithy peas, 16s. 6d. to 18s. 6d. export.

West Yorkshire—Hartley's (f.o.b. Goole), 13s. 9d. to 14s.; screened gas coal, 14s.; washed trebles, 14s. 9d. to 15s. 3d.; washed doubles, 13s. 6d. to 13s. 9d.; washed singles, 13s. 6d. to 13s. 9d.; washed smalls, 10s.; unwashed trebles, 14s.; unwashed doubles, 11s. to 11s. 3d.; rough slack, 8s. 9d. to 9s. 3d.; coking smalls, 7s. 9d. to 8s. 9d., all export.

Derbyshire and Nottinghamshire—Top hards, 16s. 6d. to 17s. 6d.; bunkers, 14s. 3d. to 15s. 3d. export; cobbles, 14s. to 15s. export; washed trebles, 14s. 6d. to 15s. export; washed doubles, 14s. export; washed singles, 13s. 6d. export; washed smalls, 12s. 3d. to 12s. 6d. bunkers, 10s. export; unwashed doubles, 11s. to 12s. export; rough slack, 11s. 6d. to 11s. 9d. bunkers, 9s. to 9s. 6d. export.

Yorkshire, Derbyshire, and Nottinghamshire—Screened steam coal, 15s. to 16s. bunkers, 12s. to 13s. 3d. export; gas coke, 21s. to 23s. export; furnace coke, 18s. 6d. to 19s. 6d. export; washed steam, 15s. 9d. to 16s. 3d. bunkers, all per ton.

MIDLANDS.

The completion of the first half of the year has brought rather more spot lots on to the market; collieries being anxious to effect a reduction in their stocks. Trade is too inert, however, for any measures of improvisation to have much chance of success. Merchants have taken advantage of the opportunity of picking up specially cheap lots to issue lists of "summer prices."

Business is not to be stimulated to any appreciable extent by these methods, however. The house coal trade is at its lowest ebb, and in the present relation of supply and demand consumers are not to be persuaded to take much thought for the morrow. There is no improvement in sight so far as the requirements of industry are concerned.

Slacks and smalls are plentiful. It is in regard to these chiefly that anxiety is shown to relieve congestion at the pits. Slacks are readily obtainable at from 6s. to 7s. at the pithead; but best grades are quoted up to 10s. Beans and nuts are offered at from 8s. to 14s.

The difficulties experienced by ovenmen in finding outlets for their coke are likely to be accentuated by a curtailment of pig iron production at Midland furnaces. One Northamptonshire furnace (Cransley, Kettering) is being blown out forthwith, and it is expected that this lead will be followed by other smelters.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

London, *June* 25.

The market in tar products continues quiet, and there are no changes in prices to report; to-day's values being about the same as last week, viz.:

Pitch, 65s. per ton.

Creosote, 8d. to 8¼d. per gallon.

Pure benzole, about 1s. 8d. per gallon; pure toluole, 2s. 1d. to 2s. 2d. per gallon; 95/160 solvent naphtha, 1s. 6d. to 1s. 7d. per gallon.

Pyridine, 5s. 3d. to 5s. 6d. per gallon.

Tar Products in the Provinces.

June 25.

Markets for tar products are still quiet, with little or no alteration in the price.

In pitch, there is no alteration in the price, and there is little or no inquiry for same; while manufacturers still appear comfortable.

In creosote oil the market continues steady, and there is still a fair amount of demand both for home consumption and export.

Water-white products are firm. There is a good demand for benzole, and fair quantities of solvent naphtha have been sold at top prices.

Crude carbolic is a little quieter, and prices are about 1d. down all round.

Cresylic acid remains quiet, but without alteration in price.

Naphthalene is still in fair demand.

The average prices of gas-works products during the week were: Gas-works tar, 42s. 6d. to 47s. 6d. Pitch—East Coast, 60s. to 62s. 6d f.o.b. West Coast—Manchester, 54s. to 55s.; Liverpool, 56s. 6d. to 57s. 6d.; Clyde, 55s. to 57s. 6d. Toluole, naked, North, 1s. 5d. to 1s. 6d. nominal. Coal-tar crude naphtha, in bulk, North, 9d. to 10d. Solvent naphtha, naked, North, 1s. 1½d. to 1s. 2d. Heavy naphtha, North, 1s. to 1s. 0½d. Creosote, in bulk, North, liquid, 6½d. to 6¾d.; salty, 6¾d. to 6⅞d.; Scotland, 6½d. to 6⅝d. Heavy oils, in bulk, North, 8¼d. to 8½d. Carbolic acid, 60 p.c.t., 2s. 2d. to 2s. 2½d. prompt. Naphthalene, £13 to £15; salts, £5 to £5 10s., bags included. Anthracene, "A" quality, 2½d. per minimum 40 p.c.t., purely nominal; "B" quality, unsaleable.

Benzole Prices.

The following are considered to be the market prices to-day:

	s. d.		s. d.		
Crude benzole . . .	0 10½	to	0 11	per gallon at works	
Motor ,, . . .	1 4½	,,	1 5	,,	,,
90 p.ct. ,, . . .	1 7	,,	1 8	,,	,,
Pure ,, . . .	1 10	,,	1 11	,,	,,

CONTRACTS OPEN.

Coal.

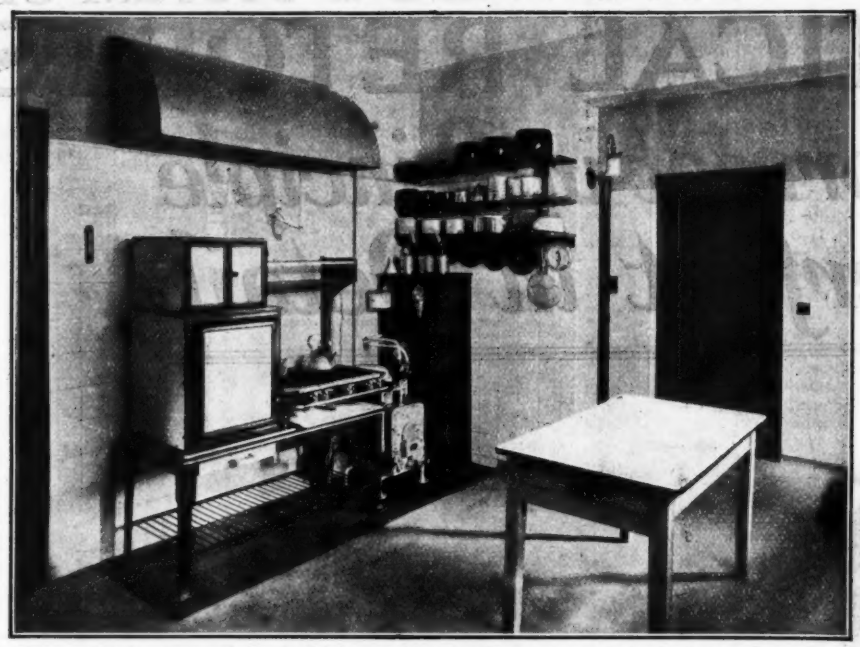
The Sidmouth Urban District Council invite tenders for the supply of gas coal. [See advert. on p. 1034.]

Retort Settings, &c.

The Ilkley Gas Department invite tenders for three settings of eight through retorts, together with mountings, fittings, &c. [See advert. on p. 1034.]

News Items continued on p. 1030.

HOME COMFORTS.



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Modern in every respect—in equipment, in lay-out, and in principle—a Kitchen provided with Gas-Heated Hot Water Supply upon the "VICTOR" System as an adjunct to an up-to-date Cooker, establishes a secure position for the Gas Undertaking in this important domestic office.

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Sudden increases of Inlet Pressure do not affect the gas supply adversely.

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Does not require "watering" frequently.

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STOCK MARKET REPORT.

THE unfavourable foreign influences continued to affect business on the Stock Exchange last week, when a hectic account was closed.

Business in gilt-edged securities was on a very restricted scale, but the satisfactory Bank return helped to maintain prices. The Foreign Market was uninteresting. French loans improved on the stabilization prospects; but Home Rails fell still further on the continued shortage of revenue.

The Gas Market was well supported. It will be seen from the Table that there were few changes in quotations, but they were in an upward direction. Hornsey consolidated 3½ p.ct. has at last received the attention that it has long deserved, and was marked up 3½ points to 82-84. The price is still low compared with Bristol 5 p.ct. maximum, which is quoted at 89½-90½ at the local exchange. Both stocks are receiving the same dividend; but the Hornsey stock has the advantage of a possible increase, and should therefore stand higher. Aldershot 5 p.ct., East Hull 5 p.ct., and Portsmouth 5 p.ct. also stand at prices below their true value. A remarkable jump is that of 10 points in the Derby consolidated, on the Nottingham Exchange, from 110-115 to 115-130. While this stock has been undervalued for some time, the sudden increase is a little surprising. Moreover, the 15 points range in the last quotation seems to require some explanation.

Issue.	Shares.	When ex-Dividend.	Dividends. Prev. Hf.Yr	Dividends. Last Hf. Yr.	NAME.	Quotations. June 22.	Rise or Fall on Week.	Transactions. Lowest and Highest Prices.
£			%p.a	% p.a.				
171,978	Stk.	Feb. 9	5	5	Aldershot 5 p.c. max. C.	74—79	..	..
412,992	,,	,,	4	4	Do. 4 p.c. Pref.	69—72	..	..
1,551,868	,,	Apl. 12	7	7	Alliance & Dublin Ord.	93—96	..	94—95
374,000	,,	Jan. 12	4	4	Do. 4 p.c. Deb.	64—67	..	..
522,654	,,	Mar. 8	7	7	Barnet Ord. 7 p.c.	109—112	..	..
300,000	1	Apl. 26	1/7½	1/7½	Bombay, Ltd.	21/—23/-	..	22/—23/-
170,000	10	Mar. 8	8½	8½	Bournemouth 5 p.c.	12½—13½	..	..
500,050	10	,,	7	7	Do. B 7 p.c.	12—12½	..	..
275,000	10	,,	6	6	Do. Pref. 6 p.c.	10½—11	..	..
50,000	Stk.	Jan. 12	3	3	Do. 3 p.c. Deb.	56—59	..	..
162,025	,,	,,	4	4	Do. 4 p.c. Deb.	76—79	..	..
357,900	,,	Mar. 8	7½	7½	Brighton & Hove 6 p.c. Con.	116—119	..	117½—118½
341,880	,,	,,	6⅝/6⅞	6⅞	Do. 5 p.c. Con.	108—106	..	..
1,287,500	,,	Feb. 23	5	5	Bristol 5 p.c. max.	89½—90½*a*	+1½	..
855,000	,,	Mar. 22	8	7	British Ord.	113—116	..	114½
100,000	,,	Dec. 22	7	7	Do. 7 p.c. Pref.	114—117	..	..
120,000	,,	,,	4	4	Do. 4 p.c. Red. Deb.	74—77	..	76
200,000	,,	,,	—	33/2	Do. 5 p.c. Red. Deb.	95—98	..	..
100,000	10	May 24	6	6	Cape Town, Ltd.	7½—8½	..	..
100,000	10	Apl. 26	4½	4½	Do. 4½ p.c. Pref.	6½—7½	..	6⅞
150,000	Stk.	Dec. 22	4½	4½	Do. 4½ p.c. Deb.	72—77	..	..
626,860	,,	Feb. 23	6	6	Cardiff Con. Ord.	98—101	..	..
237,860	,,	Jan. 12	7½	7½	Do. 7½ p.c. Red. Deb.	101—104	..	..
157,150	,,	Feb 23	5	5½	Chester 5 p.c. Ord.	88—93*b*	+1	..
79,185	1	Apl. 26	1/2/-	1/2/-	Colombo Ltd. Ord.	31/—33/-	..	..
24,495	1	,,	1/4½	1/4½	Do. 7 p.c. Pref.	20/—22/-	..	..
375,402	1	Apl. 12	1/9½	1/9½	Colonial Gas Assn. Ld. Ord.	23/—25/-	..	..
187,848	1	,,	1/7½	1/7½	Do. 8 p.c. Pref.	20/—22/-	..	..
1,073,280	Stk.	Feb. 23	5	7	Commercial Ord.	98—101	..	99½—100
475,000	,,	June 14	3	3	Do 3 p.c. Deb.	57—60*	..	..
800,000	,,	Sept. 29	11	11	Continental Union, Ltd.	33—38	..	33—34
200,000	,,	Mar. 8	7	7	Do. 7 p.c. Pref.	90—95	..	93
787,560	,,	Mar. 8	6½	7	Croydon sliding scale	108—113	..	..
408,100	,,	,,	5	5	Do. max. div.	84—87	..	..
492,270	,,	Mar. 8	7	10	Derby Con.	115—130*c*	+10	..
55,000	,,	Dec. 22	4	4	Do. Deb.	71—78*c*	..	..
209,000	,,	Mar. 8	5	5	East Hull Ord. 5 p.c.	76—79	..	..
50,000	,,	Dec. 22	5	5	Eastbourne 5 p.c. Deb.	93—98	..	..
1,002,180	10	Mar. 22	†4	†6	European, Ltd.	8 9	..	8⅝—8¾
13,703,480	Stk.	Feb. 9	5	5/1/4	Gas Light & Coke 4 p.c. Ord.	18/9—19/3/	..	18/10¾—19/1½
3,690,000	,,	,,	8¼	8¼	Do. 8¼ p.c. max.	63—65	..	64½—65
4,157,020	,,	,,	4	4	Do. 4 p.c. Con. Pref.	78—81	..	80—81
5,602,690	,,	June 14	3	3	Do. 3 p.c. Con. Deb.	59—61*	..	60—60½
181,315	,,	,,	6	6	Do. 6 p.c. Br'tf'd Rd. Db.	101 –104*	..	..
1,642,770	,,	,,	5	5	Do. 5 p.c. Red. Deb.	98½—100½*	..	99½—100½
42,000	,,	—	7½	7½	Do. 7½ p.c. Ilford Deb.	..	..	..
92,500	,,	Mar. 8	6½	6½	Hastings & St L. 5 p.c. Conv	87—90	..	..
258,740	,,	,,	5½	5½	Do. 3½ p.c. Conv.	68—71	..	..
70,000	10	Apl. 25	†10	†10	Hongkong & China, Ltd.	13½—14½	..	..
173,200	Stk.	Mar. 8	5	5	Hornsey Con. 3½ p.c.	82—84	+3½	..
1,976,000	,,	May 24	10	10	Imperial Continental Cap.	164—169	..	165—166
229,130	,,	Feb. 9	3½	3½	Do. 3½ p.c. Red. Deb.	68—70	..	..
235,242	,,	Mar. 8	7	7	Lea Bridge 5 p.c. Ord.	94—97	..	..
2,145,907	,,	Feb. 23	5½	5½	Liverpool 5 p.c. Ord.	92—93*b*	—½	..
600,000	,,	Mar 22	7	7	Do. 7 p.c. Red. Pref.	101½—108½*b*	..	..
165,786	,,	Feb. 23	9	8	Maidstone 5 p.c. Cap.	109—112	..	..
75,000	,, 5	June 14	†8	†8	Malta & Mediterranean	5½—6⅝*	..	5¾
541,920	Stk.	May 24	†5	†7	Montevideo, Ltd.	93—95	..	94½—95
2,061,815	,,	Mar. 8	5	5	Newcastle & Gateshead Con.	16/9—17/3*d*	+·/6	..
860,929	,,	,,	4	4	Do. 4 p.c. Pref.	74½—75¼*d*	+2	..
691,705	,,	June 29	8¼	8¼	Do. 8¼ p.c. Deb.	66½—67½*d*	..	..
131,780	,,	Mar. 8	6/18/0	6/18/0	North Middlesex 6 p.c. Con.	97—100	..	..
300,000	,,	Apl. 26	9	7	Oriental, Ltd.	116 –121	..	..
188,120	,,	Dec. 22	7½	7½	Plym'th & Ston'house 5 p.c.	108—113	..	..
414,500	,,	Feb. 23	7½	7½	Portsm'th Con. Stk. 4p.c. Std.	101—104	..	..
286,782	,,	,,	5	5	Do. 5 p.c. max.	77—80	..	..
2,334,464	1	—	—	—	Primitiva Ord.	25/9—26/9	..	25/9—26/7½
244,500	100	June 1	4	4	Do. 4 p.c. Red. Deb.	91—94*	..	..
695,000	Stk.	Jan. 26	4	4	Do. 4 p.c. Red. Deb. 1911	76—78	..	77½—78½
416,845	,,	Dec. 22	4	4	Do. 4 p.c. Cons. Deb.	75—77	..	76
150,000	10	Mar. 22	6	6	San Paulo 6 p.c. Pref.	8½—8¾	..	..
125,000	50	Jan. 3	5	5	Do. 5 p.c. Red. Deb.	48—50	..	48½
370,000	Stk.	Mar. 22	6	6	Sheffield A	101—103*s*	..	..
419,968	,,	,,	6	6	Do. B	101—103*s*	..	..
1,047,000	,,	,,	6	6	Do. C	101—103*s*	..	..
90,000	10	June 14	6	8	South African	4—6*	..	..
6,609,895	Stk.	Feb. 23	5	7½	South Met. Ord.	105½—107½	..	106—107½
500,000	,,	,,	—	6	Do. 6 p.c. Irred. Pf.	110—113	..	111¾
1,895,445	,,	Jan. 12	3	3	Do. 3 p.c. Deb.	59—62	..	60¾
784,000	,,	Mar. 8	6½	6½	Do. 6½ p.c. Red. Db.	100—102	..	101½—102
91,500	,,	Feb. 23	8½	8½	South Shields Con.	112—113*d*	..	..
1,243,795	,,	Feb. 23	6½	6½	South Suburban Ord. 5 p.c.	105—108	..	107½—107¾
868,837	,,	Dec. 22	5	5	Do. 5 p.c. Deb.	96—98	..	97—97½
647,740	,,	Mar. 24	5	5	South'mpton Ord. 5 p.c. max.	78—80	..	..
121,275	,,	Dec. 22	4	4	Do. 4 p.c. Deb.	73—76	..	..
250,000	,,	Mar. 8	7	7	Swansea 7 p.c. Red. Pref.	100—103	..	..
300,000	,,	Dec. 22	6½	6½	Do. 6½ p.c. Red. Deb.	100—102	..	..
120,000	,,	Feb. 23	7½	7½	Tottenham District A 5 p.c.	115—120	..	116
882,275	,,	,,	6½	6½	Do. B 8½ p.c.	94—97	..	95½—97
150,000	,,	,,	5½	5½	Do. 5½ p.c. Pref.	98—101	..	..
191,905	,,	June 14	4	4	Do. 4 p.c. Deb.	76 –79*	..	..
289,094	,,	Mar. 8	6½	6⅞	Uxbridge, Maidenhead, & Wycombe 5 p.c.	90—95	..	..
98,330	,,	,,	5	5	Do. 5 p.c. pref.	86—90	..	..
20,000	,,	Mar. 8	8½	8½	Wandsworth, Wimbledon, and Epsom— Wandsworth A 5 p.c.	129—134	..	..
355,636	,,	,,	7	7	Do. B 5½ p.c.	111—116	..	..
432,585	,,	,,	5/19/0	5/19/0	Do. C and New	98—103	..	..
332,000	,,	,,	6⅝	6⅝	Do. Wimbledon 5 p.c.	106—111	..	..
38,000	,,	,,	7½	7½	Do. Epsom 5 p.c.	112 –117	..	..
200,000	,,	,,	5	5	Do. 5 p.c. Pref	86—91	..	89½
58,416	,,	Dec. 22	3	3	Do. 3 p.c. Deb.	57—60	..	59
234,743	,,	,,	4	4	Do. 4 p.c. Deb.	77—80	..	..

Quotations at:—*a.*—Bristol. *b.*—Liverpool. *c.*—Nottingham. *d.*—Newcastle. *e.*—Sheffield. *f.*—The quotation is per £1 of Stock. * Ex. div. † Paid free of income-tax. ‡ For year.

The following transactions were recorded during the week:

On Monday, Alliance and Dublin 94, Continental Union 34, European 8½, Gas Light and Coke 18s. 10½d., 19s., 19s. 1½d., 4 p.ct. preference 81, Imperial Continental 165, 165½, 165¾, Primitiva 26s. 1½d., 26s. 3d., 26s. 4½d., 26s. 6d., 26s. 7½d., 4 p.ct. debenture (1911) 77½, San Paulo 5 p.ct. debentures (reg.) 48½, South Metropolitan 106½, 107, 3 p.ct. debenture 60¾, Tottenham "A" 116½. Supplementary prices, Brighton and Hove 4 p.ct. debenture 77, British, Hull, 3½ p.ct. debentures 63, Grays and Tilbury new 5 p.ct. debenture 98½, 98¾, Tottenham 5 p.ct. mortgages (iss. at 96½, partly-paid) 2, 2¼ pm., Wandsworth 5 p.ct. debenture 101.

On Tuesday, Alliance and Dublin 94½, 94¾, 95, Bombay 22s., Commercial 100, Gas Light and Coke 18s. 10½d., 19s., 19s. 0¾d., 3½ p.ct. maximum 64½, 4 p.ct. preference 81, 3 p.ct. debenture 60½, 5 p.ct. debenture 100½, Imperial Continental 165½, 166½, Primitiva 26s. 6d., 4 p.ct. debenture (1911) 78½, Tottenham "B" 95¾, 97. Supplementary prices, British, Hull, 3½ p.ct. debentures 64¾, Norwich 3½ p.ct. debentures 63, 64¾, Hartlepool 5 p.ct. deb. 99.

On Wednesday, Bombay 22s. 6d., 23s., Cape Town 4½ p.ct. preference 6½⅝, Continental Union 33, European 8½, Gas Light and Coke 18s. 10½d., 18s. 11¼d., 19s., 19s. 0¾d., 3½ p.ct. 65, 4 p.ct. preference 81, Imperial Continental 165½, 166, Primitiva 26s., 26s. 1½d., 26s. 3d., 26s. 4½d., South Metropolitan 106, 106⅞, 107½, 6 p.ct. preference 111½. Supplementary prices, Bath 5 p.ct. debenture 93¾, Crowborough 64½, 65, Danish 7¼, South Suburban 7 p.ct. debenture 103, Southend-on-Sea new 92.

On Thursday, Bombay 22s. 9d., 23s., Commercial 99¾, Gas Light and Coke 18s. 10½d., 19s., 19s. 0¾d., 19s. 1½d., 4 p.ct. preference 80, 3 p.ct. debenture 60, 5 p.ct. debenture 99½, Montevideo 94½, Primitiva 25s. 9d., 25s. 10½d., 26s. 3d., 4 p.ct. consolidated debenture 76, South Metropolitan 6½ p.ct. debenture 101½, South Suburban 5 p.ct. 107½, Tottenham "B" 95¾, 96¾, Wandsworth 5 p.ct. preference 89½, 3 p.ct. debenture 59. Supplementary prices, Cheltenham 5 p.ct. 75¾, Holyhead and North Wales 7s. 10½d., 8s. 1½d., South Suburban 7 p.ct. debenture 103¾.

On Friday, Alliance and Dublin 94½, Brighton and Hove 6 p.ct. 117½, 118½, British 114½, 4 p.ct. debenture 76, Commercial 99½, Continental Union 7 p.ct. preference 93, European 8¾, Gas Light and Coke 18s. 10½d., 19s., 19s. 1½d., 4 p.ct. preference 80, 3 p.ct. debenture 60, Malta and Mediterranean 5½, Montevideo 95, Primitiva 25s. 9d., 25s. 10½d., 26s. 1½d., 26s. 3d., 26s. 6d., South Metropolitan 106, 106¾, 6½ p.ct. debenture 102, South Suburban 5 p.ct. 107½, 5 p.ct. debenture 97, 97½. Supplementary prices, British, Norwich 3½ p.ct. debentures 63½, Farnham additional 11½, Hastings and St. Leonards 3½ p.ct. debenture 63¼, Pinner 7 p.ct. "B" 6⅞, South Suburban 7 p.ct. debenture 104, Wandsworth 5 p.ct. debenture 100½, 101.

The demand for Treasury Bills last week was less than it has been for a considerable time. Thirty-five millions were offered, and applications totalled forty-three millions only. The hardening of discount rates, however, was reflected in the average rate, which, at £3 16s. 4·92d. p.ct., was 1s. 2·81d. p.ct. above the previous week's rate. Conditions were favourable in the short loan market. Old day-to-day loans were renewable at 3¼ p.ct., and new loans were obtainable at 3 p.ct. There is a possibility of a brief period of stringency at the close of the half-year.

On the Foreign Exchange Market, the dollar-sterling was lower at 4.87⅜⅝. The French exchange was steady at 124.20. A sharp recovery occurred in pesetas, which closed at 29.38, on the definite news of State action designed to check speculation. Belgas finished at 34.92; Italian lire closed at 92.71½; and Dutch florins at 12.10.

Silver was steady at 27⅛d. per oz.; and Gold was quoted at 84s. 10½d. per oz.

The Bank Rate is 4½ p.ct., to which it was reduced from 5 p.ct. on April 21, 1927. The Banks' deposit rate is 2½ p.ct., and the deposit rates of the discount houses are 2¼ and 2⅜ p.ct.

TRADE NOTES.

Mersey Tunnel.

The Stanton Ironworks Company, Ltd., near Nottingham, have secured the contract for over 50,000 tons of cast-iron segments for the Mersey Tunnel.

New Otto Regenerative Coke Ovens.

The Silica Coke Oven and Machinery, Ltd., of Aldwych House, W.C. 2, have published an interesting booklet (Bulletin No. 3) dealing with the new Otto regenerative coke oven of the compound or combination type.

"On the Subject of Meters."

This is the title of an intriguing little book, of which we have received a copy from Messrs. Alder & Mackay, Ltd., New Grange Works, Stewart Terrace, Edinburgh. It deals in a readable manner with the specialities of the firm—standard dry meters, high capacity meters, slot meters, &c. It also indicates the wide distribution of the firm's goods.

Oldham Gas Department.

The annual report of Mr. Ernest Parry, the Commercial Superintendent of the Oldham Gas Department, states that the net profit for the year was £4506, making, with the credit balance from the previous year, £9325. Taking into account £4000 contributed to the Borough Fund, the final credit balance was £5325. The quantities of gas manufactured at the different stations during the year ended March 25 were: Oldham 225 millions, Higginshaw 711 millions, and Hollinwood 778 millions. The total make was 1715 million c.ft. The total number of meters fixed on March 25 last was 61,181, which is an increase of 819 as compared with last year. Cooking stoves and grillers in use numbered 32,769 (excluding stoves owned by consumers), an increase of 861 during the year. The net increase in the number of additional gas fires, &c., fixed during the year was 4045. The number in use on March 25 was 13,521, excluding fires, &c., owned by consumers. The number of gas-wash boilers in use on hire terms was 6432—an increase of 3057 during the year.

Alfreton Gas Prices.—The Directors of the Alfreton Gas Company have decided to reduce the price of gas by 3d. per 1000 c.ft. as from the June meter readings.

Reduced Price at Dewsbury.—The Dewsbury Corporation General Purposes Committee have approved a reduction in the price for gas for all purposes from 4s. 2d. to 3s. 11d. per 1000 c.ft. Subject to formal confirmation by the Town Council, the change will operate from Sept. 30.

Issue of Stock at Rugby.—The Directors of the Rugby Gas Company have instructed Messrs. A. & W. Richards to offer for sale by tender £17,750 5½ p.ct. perpetual debenture stock in the Company; the minimum price of issue being par. Tenders should reach Messrs. Richards, 37, Walbrook, E.C. 4, not later than 11 a.m. on Thursday, July 5.

Capital Issue at Littlehampton.—Messrs. A. & W. Richards are offering for sale by tender, on behalf of the Directors of the Littlehampton Gas Company, 2000 £5 "B" ordinary shares, ranking for a standard dividend of 7 p.ct., subject to the sliding-scale, equally with the existing similar shares which have for the last four years received a dividend of 8 p.ct. per annum. The minimum price of issue is £5 15s. per share, at which the yield will be £6 19s. 2d. p.ct. The Company was established in 1847, and incorporated by Special Act of Parliament in 1909, for supplying gas in Littlehampton and the adjacent district; the statutory area of supply covering 18 square miles, in several parts of which considerable development is taking place. There are 3530 consumers, and the capital now being issued is required for extension of the works, mains, &c., rendered necessary by the increasing demand for gas.

Bingley to Have New Plant.—The Bingley Urban District Council, who have for some months past been considering several alternative schemes for the renewal or extension of gas-works plant to meet the growing consumption, have decided to seek power to borrow approximately £60,000 for extensions. It is not expected to spend more than about £31,000 at present—this being for vertical carbonizing plant, which is urgently needed, owing to the fact that the maximum demand has outstripped productive capacity, and even the existing maximum capacity cannot be guaranteed in view of the age of the plant. The department at present, said Mr. T. Snowdon (Chairman of the Committee), can only store a quarter of a day's maximum demand. The new vertical plant is estimated to effect an annual saving of £4000 in productive costs. There was, as previously, considerable opposition to the projected expenditure; and the decision was reached by a majority of only one vote.

New Showrooms at Batley.—New showrooms for the Batley Corporation Gas Department were opened on June 25 by Councillor John Deasey, J.P., Chairman of the Gas Committee, in the presence of the Mayor (Councillor C. R. Spedding) and a large assembly. The Gas Engineer and General Manager, under whose planning the showrooms have been equipped, is Mr. R. H. Duxbury. The showrooms are on a rapidly developing town estate at Ward's Hill, fronting to Commercial Street, and have been specially built for the purpose. The cost of the building and fittings, including showcases, is approximately £2000; and the place has the great advantage over many showrooms that it has been specially constructed for the particular purpose involved. An exhibition of gas appliances was held in association with the opening; and the following makers had fires, cookers, and other domestic apparatus on view: Cannon Iron Foundries, General Gas Appliances, Ltd., Hygienic Stove Company, R. & A. Main, Ltd., Parkinson Stove Company, Wilsons & Mathiesons, Ltd., Welsbach Light Company, and W. H. Dean & Sons, Ltd.

Perishable Foods—A Housewives' Problem.

With the coming into force on July 1 of the new Food Regulations prohibiting the use of harmful preservatives in foodstuffs, the housewife will probably discover that it is not quite so easy as before to keep certain foods fresh at home. She may even find it essential to buy some of them in smaller quantities, unless she has some very excellent means of storing. While home refrigeration may not be an absolute essential, it will undoubtedly be an advantage in saving her from the fatigue of additional shopping excursions on hot days. It will at the same time make it possible to provide a more palatable and more varied summer menu. At a cost of from 1d. to 3½d. a day for gas, a refrigerator will, among other things, preserve cooked and uncooked food, and give an ample supply of ice, throughout the twenty-four hours without attention. There is, however, another aspect of this question. It is important for her to investigate the methods adopted by her tradesmen for keeping the food they sell her in perfect condition before it is delivered; otherwise all her care will be wasted. The thinking housewife, while she must do her part, should ask her provision merchant and her dairyman what steps they on their part are taking to keep the goods perfectly fresh until sold. By taking an intelligent and active interest in these questions arising out of the new Regulations which safeguard her from dangerous preservatives, and by dealing only with the up-to-date tradesman with efficient storage arrangements, she will be rendering a public service. An interesting booklet on the subject of domestic and commercial refrigeration has just been published by the British Commercial Gas Association. It contains many attractive illustrations and full particulars of refrigerators with from 4 to 45 c.ft. of storage space—sizes to fit into the smallest maisonette, the largest mansion, the shop, and even the large hotel.

Long Service at Walsall.—There was recently an interesting gathering at the Walsall Corporation Gas-Works, when 33 workpeople who had been granted retiring allowances were entertained at tea by members of the Gas Committee, and were afterwards presented with framed certificates in recognition of their long services. It was mentioned that two of the men had completed over fifty years' service and nine others over forty years. The presentations were made by the Deputy Mayor (Councillor J. A. Leckie), who is Chairman of the Corporation Gas Committee. He stated that allowances were made as the result of a scheme drawn up by the Works Manager and Engineer (Mr. Fred Davies) on a non-contributory basis. The Mayor (Alderman Shelley), who also spoke, emphasized the need for both Government and municipal departments seeing that provision was made so that all classes of employees should be in a position to retire at a suitable age.

Hinckley's Satisfactory Year.—A remarkably successful year is recorded by the Hinckley Gas Department. At a recent meeting of the Council, the Gas Committee reported that they had received the Gas Manager's annual report and statement of accounts for the year ended March 31, showing a net profit of £4910. It was pointed out that the Council had already decided to pay the sum of £2516 spent on capital account during the year out of profits, and that the reduction in the price of gas from the March quarter would reduce the profits by £1600. Mr. J. Bennett, Chairman of the Gas Committee, said they considered the result of the year's working most satisfactory. A sum of £21,500 had been spent for new retorts, which were nearly ready for work, and would be in operation during the coming winter. The gas sold was 186 million c.ft.—7 millions more than last year. Owing to the increased use of gas, the Committee considered it necessary to extend the works. A gasholder and four purifiers were being erected, and they hoped to have them ready by the end of the year. After negotiations extending over a long period, the Council had agreed with the Earl Shilton Gas Company to purchase their undertaking. The gas sold at Earl Shilton was about 25 million c.ft. a year; and it was intended to make all the gas required at Hinckley. The present Manager, Mr. Fred Lee, had been with them thirty years; and there had been good management to bring down the amount of gas unaccounted-for from 10·03 p.ct. to 1·48 p.ct. during that period. The gas sold in 1899 was 43 million c.ft. as compared with 186 millions for the past year. They could congratulate themselves on their Manager, who put his heart and soul into the work. It was reported that the Assistant Gas Manager (Mr. John Grayston) had obtained the Diploma of The Institution of Gas Engineers.

The public share issue in Messrs. Falk, Stadelmann, & Co., Ltd., was closed one hour after opening.

The price of gas is to be reduced at Weybridge and Walton-on-Thames from 1s. 1d. to 1s. per therm.

The Dewsbury Corporation Gas Committee have decided to reduce the price of gas for all purposes by 3d. per 1000 c.ft. from Sept. 30.

The Clitheroe Gas Committee have sanctioned an application from the National Union of Municipal Workers for extra pay for workmen engaged on painting at the gas-works. The necessary resolution was carried by one vote.

Shipley industrial and other establishments dependent on electricity were seriously inconvenienced for an hour on June 21, and the Bradford Corporation tramway service on the Bingley, Saltaire, and Buildon Bridge routes was held up, owing to a breakdown in the electricity supply from the Yorkshire Electric Power Company.

Messrs. Reavell & Co., Ltd., of Ipswich, have added to their Directorate Mr. R. L. Quertier, B.Sc., Assoc.M.Inst.C.E., M.I.Mech.E., and Mr. Kingsley Reavell, A.M.I.Mech.E. Mr. Quertier has for many years been Manager of the London Offices of the Company, and Mr. Kingsley Reavell is the son of the Managing Director, Mr. William Reavell, M.I.N.A., P.P.I.Mech.E.

E. Eng

JUL 9 192

GAS JOURNAL

LIGHT ✦ HEAT ✦ POWER ✦ BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

VOL. CLXXXII. No. 3397.] LONDON, JUNE 27, 1928. [80TH YEAR. PRICE 1s.

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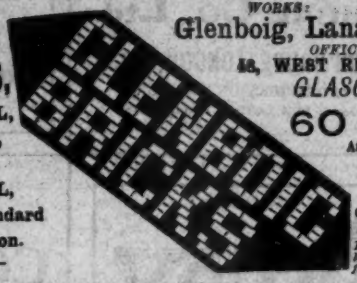

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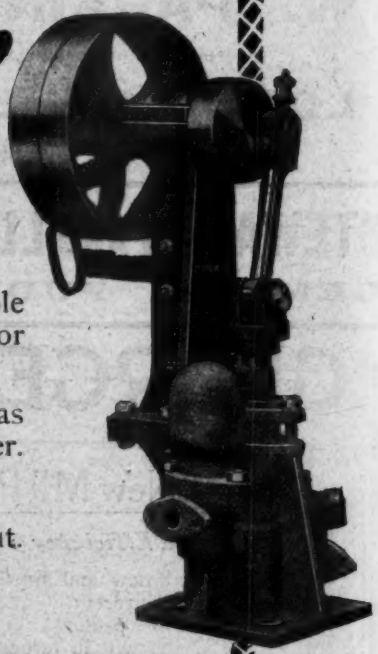

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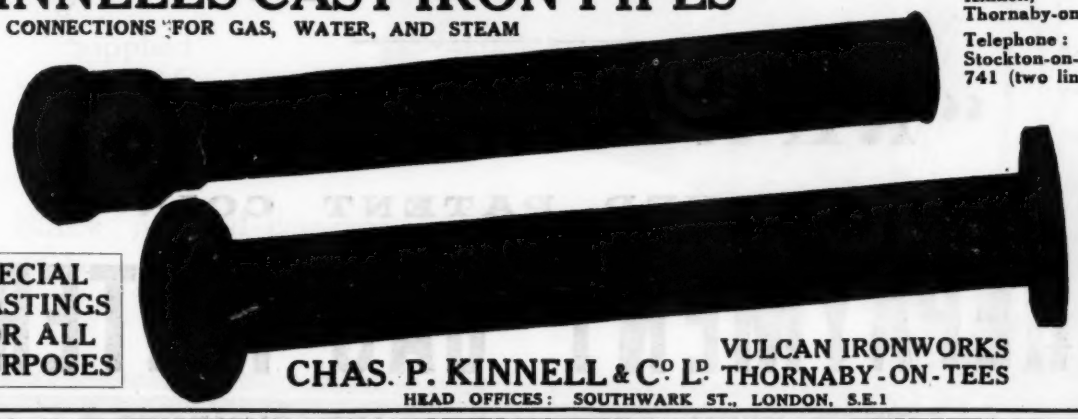

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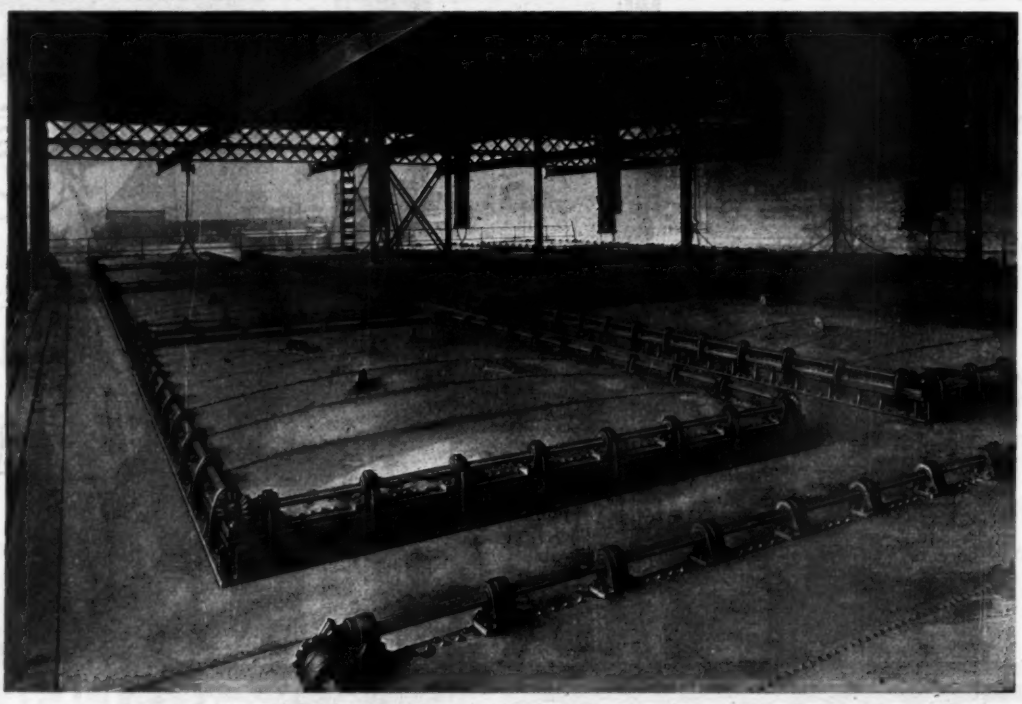

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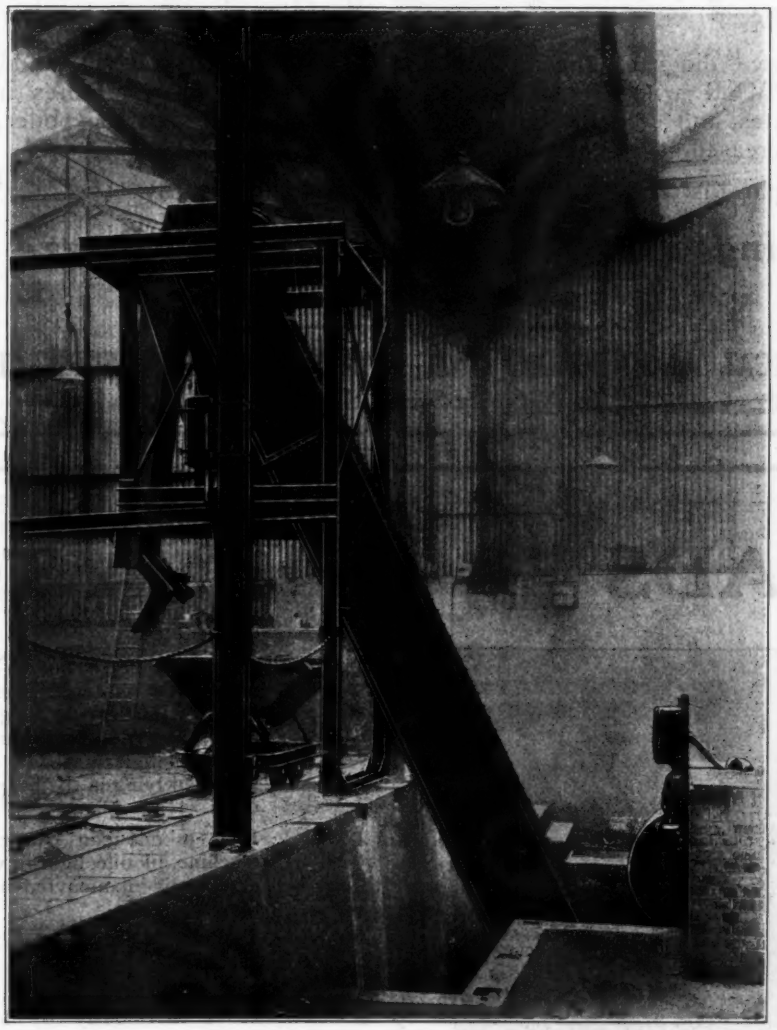

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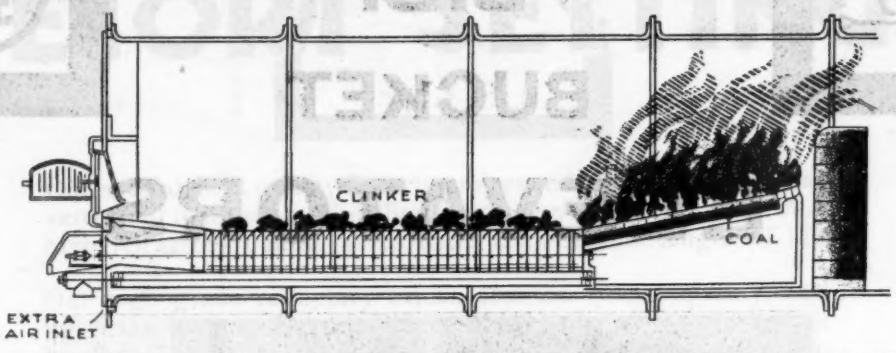

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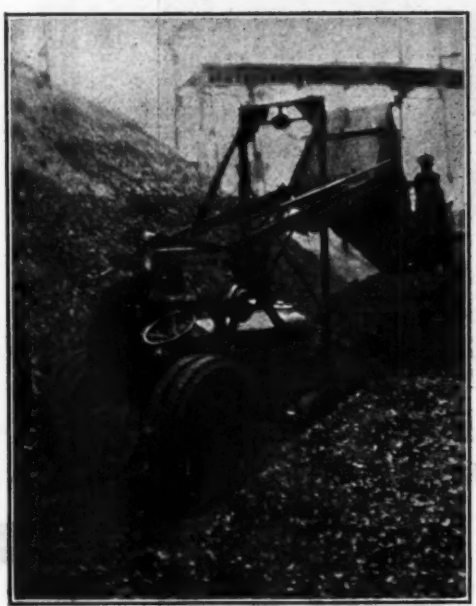

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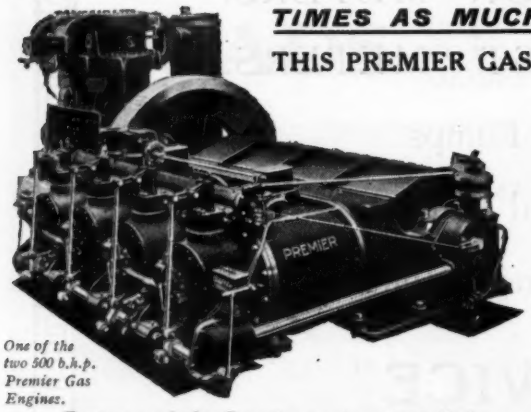

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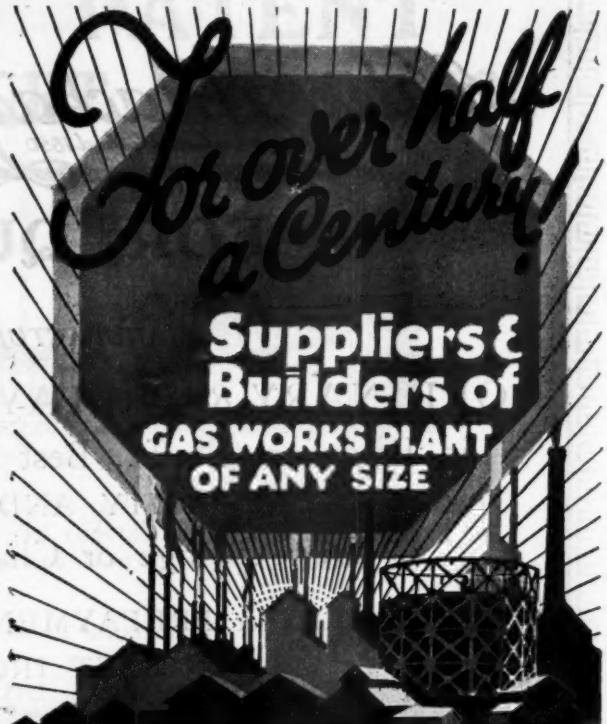

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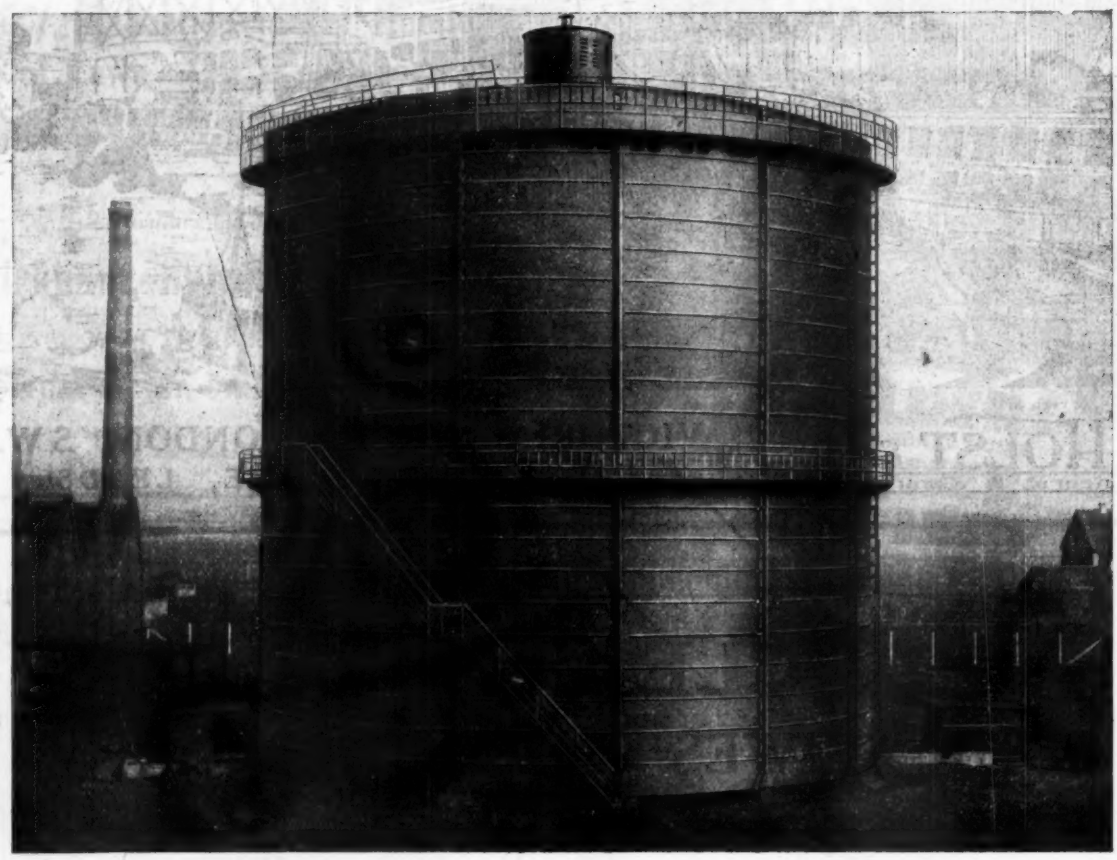

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With the introduction of this grey-mottled Porcelain Enamel Finish, Wash Boilers lay aside their familiar drab appearance and take on a new aspect which is both pleasing and practical. The enamel surface, which is of exceptional hardness and durability, is permanently "fired" on to the sheet steel and cast iron exterior. The result is a delightfully smooth surface, perfectly even in texture and tone—a surface that will not crack or chip; rust-resisting; stainless; labour-saving. A "Richmond" Wash Boiler in Porcelain Enamel makes a fitting companion to the "Bungalow" New World Cooker in the same grey-mottled finish.

Send for a supply of Enamelled Wash Boiler Lists, No. 4929.

The Richmond Gas Stove & Meter Co., Ltd.
WARRINGTON and LONDON
(Radiation Ltd., Proprietors.)

HUMPHREYS & GLASGOW, LTD.

WATER-GAS

	Cu. Ft. Daily
Aarhus	300,000
Abertillery	500,000
Abertillery	100,000
Admiralty:	
British	800,000
British	800,000
British	800,000
British	800,000
French	800,000
French	800,000
Agram	280,000
Airdrie	420,000
Aldershot	1,400,000
Aldershot	1,000,000
Aldershot	1,314,000
Alkmaar	400,000
Allenstein	200,000
Alost	700,000
Amerstoort	350,000
Amsterdam	1,000,000
Amsterdam	1,000,000
Amsterdam	2,700,000
Antwerp	1,500,000
Antwerp	1,000,000
Antwerp	1,500,000
Antwerp	1,900,000
Ascot	433,000
Ashford	360,000
Azmbras	650,000
Augsburg	425,000
Aylesbury	150,000
Aylesbury	476,000
Banbury	200,000
Banff	125,000
Barmen	600,000
Barnsley	888,000
Barrow	300,000
Barrow	600,000
Barry	500,000
Barry	720,000
Bath	1,000,000
Bath	1,000,000
Bath	1,300,000
Belfast	1,700,000
Belfast	4,500,000
Belfast	1,250,000
Belfast	1,250,000
Belfast	2,250,000
Benrath	125,000
Berkhampstead	250,000
Berlin:	
Charlottenb'g	2,500,000
Danziger Str.	1,800,000
Neukoelin	650,000
Neukoelin	700,000
Schmargendorf	780,000
Tegel	3,800,000
Tegel	4,350,000
Tegel	245,000
Bideford	258,000
Bilston	375,000
Bilston	125,000
Birmingham:	
Adderley St.	675,000
Nechells	3,000,000
Nechells	3,000,000
Nechells	3,000,000
Swan Village	1,800,000
Windsor St.	3,000,000
Windsor St.	3,000,000
Bishop's Stortford	200,000
Bishop's Stortford	300,000
Bishop's Stortford	200,000
Blackburn	1,190,000
Blantyre	150,000
Blois	125,000
Blois	125,000
Bochum	830,000
Bognor	100,000
Bognor	423,000
Bo'ness	126,000
Boulogne	340,000
Bournemouth	1,000,000
Bournemouth	500,000
Bournemouth	1,500,000
Bournemouth	1,000,000
Bournemouth	500,000
Bournemouth	1,530,000
Bournemouth	2,000,000
Bournemouth	500,000
Bournemouth	2,750,000
Bremen	550,000
Bremen	950,000
Bremen	850,000
Brentwood	250,000
Brescia	588,000
Brest	550,000
Bridgwater	200,000
Bridlington	150,000
Bridlington	200,000
Bridlington	550,000
Brieg	100,000
Brierley Hill	250,000
Brighton	1,750,000
Brighton	1,850,000
Brighton	750,000
Brighton	2,750,000
Bristol	2,000,000
Bristol	2,500,000
Bristol	825,000
Bristol	825,000
Bromley	1,500,000
Bruges	200,000
Bruges	600,000
Brussels:	
Anderlecht	350,000
Anderlecht	350,000
Forest	1,000,000
Forest	1,000,000
Forest	1,000,000
Forest	1,500,000
Forest	1,500,000
Forest	1,500,000
Koekelberg	1,080,000
St. Gilles	1,000,000
St. Josse	1,000,000
St. Josse	600,000
St. Josse	775,000
Ville	750,000
Ville	750,000
Ville	1,500,000
Ville	350,000
Bucarest	1,100,000
Buckie	164,000
Budapest	50,000
Budapest	1,750,000
Budapest	200,000
Budapest	250,000
Caen	250,000
Cambridge	500,000
Cambridge	1,000,000
Cardiff	2,000,000
Cardiff	3,000,000
Cardiff	1,950,000
Cardiff	600,000
Carlisle	600,000
Carlsruhe	500,000
Carnarvon	248,000
Charleroi	1,250,000
Châteauroux	125,000
Châteauroux	125,000
Châtelet	500,000
Chester	864,000
Chesterfield	450,000
Chesterfield	90,000
Chesterton	197,000
Chichester	250,000
Chorley	300,000
Cie. des Compteurs	1,180,000
Cie. Lorraine de Ch.	210,000
Cie. Mines de Roche	585,000
Coatbridge	400,000
Commercial, L'n	950,000
Commercial	860,000
Commercial	1,250,000
Commercial	2,600,000
Commercial	800,000
Commercial	2,100,000
Copenhagen	700,000
Copenhagen	2,500,000
Copenhagen	1,750,000
Courtrai	250,000
Coventry	600,000
Coventry	600,000
Coventry	800,000
Coventry	1,250,000
Coventry	350,000
Cowdenbeath	420,000
Cracow	200,000
Cracow	200,000
Cranleigh	188,000
Crefeld	500,000
Crewe	700,000
Crewe	800,000
Crosfield & Sons	1,500,000
Crosfield & Sons	1,500,000
Crowborough	150,000
Croydon	1,250,000
Croydon	625,000
Croydon	625,000
Croydon	550,000
Croydon	650,000
Croydon	1,125,000
Croydon	150,000
Croydon	3,000,000
Deal	250,000
Deal	250,000
Debreczin	100,000
Derby	1,500,000
Derby	2,000,000
Deventer	150,000
Deventer	200,000
Devonport	1,600,000
Devonport	1,100,000
Doncaster	1,350,000
Dorking	150,000
Dorking	300,000
Dorking	130,000
Dover	500,000
Dublin	2,000,000
Dublin	2,000,000
Dublin	650,000
Dudley	600,000
Dundee	1,500,000
Dunedin, N.Z.	750,000
Dunedin	275,000
Durham	300,000
Dusseldorf	1,000,000
Eastbourne	1,250,000
Eastbourne	1,500,000
Edinburgh	3,000,000
Eindhoven	1,500,000
Enschede	282,000
Epsom	225,000
Epsom	300,000
Essen	1,400,000
Essen-Borbeck	1,400,000
Exeter	1,100,000
Exmouth	376,000
Falmouth	150,000
Faversham	200,000
Flensburg	300,000
Flensburg	125,000
Forst	200,000
Frankenthal	175,000
Fuel Research Wks.	500,000
Fuel Research Wks.	500,000
Furnes	500,000
Gabians	140,000
Gas L. & C. Co.:	
Beckton	10,000,000
Beckton	7,000,000
Beckton	3,500,000
Beckton	7,000,000
Beckton	7,000,000
Beckton	5,250,000
Beckton	4,500,000
Beckton	3,000,000
Bow Common	1,000,000
Bow Common	1,150,000
Bow Common	150,000
Brentford	1,300,000
Brentford	250,000
Brentford	350,000
Brentford	750,000
Bromley	2,750,000
Bromley	2,250,000
Bromley	1,000,000
Bromley	1,000,000
Bromley	1,000,000
Bromley	3,450,000
Bromley	1,250,000
Fulham	2,500,000
Fulham	1,700,000
Ilford	650,000
Ilford	750,000
Kensal Green	2,250,000
Kensal Green	2,250,000
Kensal Green	2,250,000
Nine Elms	2,750,000
Nine Elms	750,000
Nine Elms	1,870,000
Nine Elms	2,850,000
Shoreditch	900,000
Shoreditch	2,700,000
Shoreditch	2,725,000
Southall	2,800,000
Southall	3,000,000
Staines	600,000
Stratford	1,700,000
Stratford	850,000
Stratford	2,250,000
Stratford	2,250,000
Gelsenkirchen	175,000
Gelsenkirchen	350,000
Geneva	800,000
Geneva	700,000
Gennevilliers	10,600,000
Gennevilliers	2,900,000
Girvan	235,000
Glasgow	3,000,000
Glasgow	2,500,000
Glasgow	2,250,000
Glossop	340,000
Gloucester	800,000
Gloucester	1,000,000
Gosport	300,000
Gosport	225,000
Göteborg	300,000
Göteborg	600,000
Graudenz	300,000
Grays	250,000
Grays	400,000
Groningen, Holland	500,000
Guest Keen & Piggotts, Ltd.	1,536,000
Guildford	350,000
Guildford	200,000
Guildford	350,000
Guildford	1,100,000
Guildford	150,000
Haarlem	880,000
Hamburg	1,750,000
Hampton Court	500,000
Hampton Court	600,000
Hampton Court	1,100,000
Hanley	800,000
Hanley	800,000
Hartlepool	750,000
Hartlepool	765,000
Haywards Heath	470,000
Hebden Bridge	200,000
Heidelberg	200,000
Hereford	525,000
Hertford	197,000
Hertford	244,000
Heusle	150,000
High Wycombe	792,000
Hilversum	850,000
Hinckley	250,000
Holyhead	197,000
Hong Kong	450,000
Hong Kong	450,000
Hornsey	1,000,000
Hornsey	1,000,000
Hornsey	750,000
Hornsey	750,000
Horsham	225,000
Hull	1,500,000
Hull	1,000,000
Hull	1,600,000
Innsbruck	200,000
Ipswich	750,000
Ipswich	1,250,000
Jersey	864,000
Kampen	350,000
Karlsbad	350,000
Kendal	329,000
Kidsgrove	225,000
Kiel	1,000,000
Kiel	880,000
Kilmarnock	500,000
Kilmarnock	585,000
King's Lynn	197,000
Kirkintilloch	360,000
Kirkintilloch	227,000
Kolozvar	100,000
Lancaster	500,000
Largs	230,000
Lausanne	250,000
Lausanne	285,000
Le Mans	420,000
Lea Bridge	350,000
Lea Bridge	350,000
Lea Bridge	425,000
Lea Bridge	1,000,000
Lea Bridge	1,800,000
Lea Bridge	1,530,000
Leamington	600,000
Leamington	525,000
Leatherhead	705,000
Leeds	4,500,000
Leeuwarden	400,000
Leiden	800,000
Leiden	875,000
Leigh	250,000
Limberg	260,000
Lemberg	800,000
Letchworth	362,000
Letchworth	433,000
Liège	1,000,000
Liège	750,000
Lille	800,000
Lincoln	500,000
Lincoln	893,000
Liverpool	3,500,000
Liverpool	4,500,000
Liverpool	750,000
Liverpool	1,750,000
Liverpool	1,250,000
Liverpool	3,000,000
Liverpool	1,500,000
Liverpool	1,250,000
Liverpool	2,350,000
Long Eaton	438,000
Long Eaton	170,000
Longton	600,000
Louvain	800,000
Lubeck	409,000
Luton	400,000
Maastricht	200,000
Macclesfield	800,000
Magdeburg	1,400,000
Maidenhead	225,000
Maidenhead	225,000
Maidenhead	175,000
Maidenhead	175,000
Maidstone	500,000
Maidstone	500,000
Malines	500,000
Malines	875,000
Malmö	350,000
Malta	400,000
Manchester	3,500,000
Manchester	3,500,000
Manchester	1,500,000
Mansfield	330,000
Mansfield	493,000
Marlborough	100,000
Mayence	700,000
Melbourne	5,000,000
Merthyr Tydfil	300,000
Merthyr Tydfil	200,000
Middlesbrough	1,350,000
Middlesbrough	750,000
Middlesbrough	900,000
M/M. Woolston	9,000,000
Monaco	275,000
Monaco	618,000
Mons	800,000
Montevideo	1,222,000
Morecambe	333,000
Moscow	1,000,000
Munich	1,400,000
Namur	175,000
Narbonne	350,000
Nelson	400,000
Neuss	140,000
Newbury	250,000
Newcastle	2,500,000
Newcastle, N.S.W.	600,000
Newport Pagnell	188,000
Nice	900,000
Nicheroy	250,000
N. Middlesex	150,000
N. Middlesex	200,000
N. Middlesex	75,000
N. Middlesex	650,000
N. Middlesex	650,000
N. Middlesex	1,000,000
Northfleet	235,000
North Sydney	800,000
North Sydney	500,000
Norwich	1,000,000
Norwich	300,000
Norwich	500,000
Norwich	1,500,000
Nottingham	1,000,000
Nottingham	1,000,000
Nuneaton	125,000
Oberhausen	175,000
Oldbury	600,000
Oldenburg	300,000
Ormskirk	170,000
Ostend	100,000
Ostend	200,000
„ Zandvoorde	700,000
Palermo	963,000
Palermo	850,000
Paris:	
Chicky	4,000,000
Ivry	1,870,000
Landy	6,000,000
Landy	6,000,000
La Villette	4,000,000
La Villette	2,000,000
St. Mandé	1,870,000
Paris-Plage	125,000
Pau	550,000
Pembroke	240,000
Perigueux	360,000
Perth, W.A.	125,000
Piggott & Co.	1,500,000
Plymouth	2,000,000
Poitiers	350,000
Pontypool	120,000
Port Elizabeth	400,000
Portsmouth	1,000,000
Portsmouth	2,000,000
Portsmouth	800,000
Portsmouth	2,000,000
Posen	450,000
Posen	700,000
Prague	140,000
Preston	1,400,000
Ramsgate	430,000
Reading	1,000,000
Reading	1,000,000
Reading	600,000
Redditch	500,000
Redhill	275,000
Redhill	300,000
Redhill	1,100,000
Reichenberg	200,000
Reichenberg	200,000
Reval	350,000
Rhymney	175,000
Rhymney	250,000
Riddings	258,000
Ripley	120,000
Rochester	2,200,000
Rochester	2,800,000
Romford	300,000
Romford	350,000
Rotterdam	850,000
Rotterdam	1,500,000
Rotterdam	750,000
Rotterdam	750,000
Rotterdam	600,000
Rotterdam	2,000,000
Royston (Yorks.)	250,000
Rugby	1,000,000
Runkiten	425,000
Rushden	317,000
Saffron Walden	235,000
St. Albans	700,000
St. Andrews	210,000
St. Andrews	409,000
St. Gallen	225,000
St. Gallen	225,000
Ste. Ch.Gr. Paroisse	1,320,000
Sté. Pr. Ch. Kuhlmann	1,270,000
Sté. Tubes Meuse	545,000
San Paulo	700,000
Scarborough	800,000
Scarborough	300,000
Scarborough	350,000
Scarborough	1,300,000
Scarborough	1,350,000
Seaford	200,000
Shanghai	225,000
Shanghai	225,000
Shanghai	1,600,000
Shanklin	259,000
Sheerness	200,000
Sheerness	180,000
Sheerness	300,000
Sheffield	1,530,000
„ Steel Prods.	5,000,000
Shrewsbury	300,000
Sidmouth	225,000
Sittingbourne	259,000
Southampton	800,000
Southampton	500,000
Southampton	600,000
Southampton	100,000
Southampton	1,000,000
Southend	1,250,000
Southend	900,000
Southend	900,000
Southgate	400,000
Southgate	500,000
Southgate	800,000
Southgate	500,000
Southport	750,000
Southport	900,000
Southport	900,000
Southport	450,000
South Shields	650,000
South Shields	1,250,000
Stafford	500,000
Stettin	880,000
Stirling	400,000
Stockholm	1,500,000
Stockholm	1,750,000
Stockport	600,000
Stockport	600,000
Stockport	400,000
Stockport	400,000
Stockton	500,000
Stockton	250,000
Stourbridge	500,000
Stourbridge	500,000
Sunderland	2,250,000
Sunderland	300,000
Sutton	1,269,000
Swansea	730,000
Swansea	1,000,000
Swansea	450,000
Swansea	1,250,000
Swansea	2,000,000
Swindon	300,000
Swindon	450,000
Swindon	400,000
Sydney	1,000,000
Sydney	1,000,000
Sydney	1,000,000
Sydney	1,000,000
Sydney	2,250,000
Taunton	225,000
Taunton	350,000
Tawe Valley	275,000
Teignmouth	200,000
The Hague	1,000,000
The Hague	500,000
The Hague	1,750,000
The Hague	1,500,000
The Hague	775,000
The Hague	1,500,000
Tilburg	400,000
Tirlemont	120,000
Tokyo	2,000,000
Torquay	350,000
Torquay	350,000
Torquay	320,000
Tottenham	750,000
Tottenham	750,000
Tottenham	350,000
Tottenham	1,000,000
Tottenham	1,000,000
Tottenham	1,250,000
Tottenham	2,500,000
Tottenham	1,000,000
Tottenham	500,000
Tottenham	1,000,000
Toulouse	1,800,000
ToulouseNatl Wks.	2,400,000
ToulouseNatl Wks.	6,200,000
Tournai	700,000
Tours	550,000
Trowbridge	250,000
Tunbridge Wells	1,000,000
Tunbridge Wells	1,000,000
Tunis	175,000
Tynemouth	1,100,000
Tynemouth	1,100,000
Ulm	400,000
Utrecht	1,000,000
Utrecht	1,000,000
Uxbridge	752,000
Vancouver	3,800,000
Verviers	1,000,000
Vienna	3,500,000
Vienna	2,500,000
Walsall	750,000
Walsall	375,000
Waltham	400,000
Waltham	140,000
Wandsbek	125,000
Wandsworth	1,800,000
Wandsworth	4,230,000
Wanganui, N.Z.	376,000
Ware	150,000
Ware	282,000
Warwick	125,000
Wasmuel	500,000
Watford	300,000
Watford	350,000
Watford	400,000
Wath	430,000
Weimar	100,000
Wellingborough	525,000
Wellingborough	525,000
Wellington, N.Z.	350,000
West Bromwich	550,000
Westgate	250,000
Weston-Mare	350,000
Weston-Mare	350,000
Weston-Mare	150,000
Weston-Mare	150,000
Wexford	100,000
Weymouth	430,000
Weymouth	100,000
Weymouth	658,000
Whitstable	423,000
Widnes	500,000
Wiesbaden	850,000
Winchester	225,000
Winchester	125,000
Winchester	410,000
Woking	400,000
Wolverhampton	1,500,000
Wolverhampton	1,000,000
Wolverhampton	250,000
Wolverhampton	400,000
Worthing	525,000
Yarmouth	500,000
Yarmouth	125,000
Yeovil	340,000
Zwolle	200,000
Zwolle	200,000
Zwolle	700,000

842 *Sets of Humphreys-Glasgow Plant have been (and are being) installed with a capacity of over* **674,000,000** *cubic ft. of Water-Gas per diem. Including the work of their American Colleagues,* **1902** *Sets have been constructed with a total* **DAILY** *capacity of* **1,912,900,000** *cubic feet.*

Head Office: 88, VICTORIA STREET, LONDON, S.W. 1.

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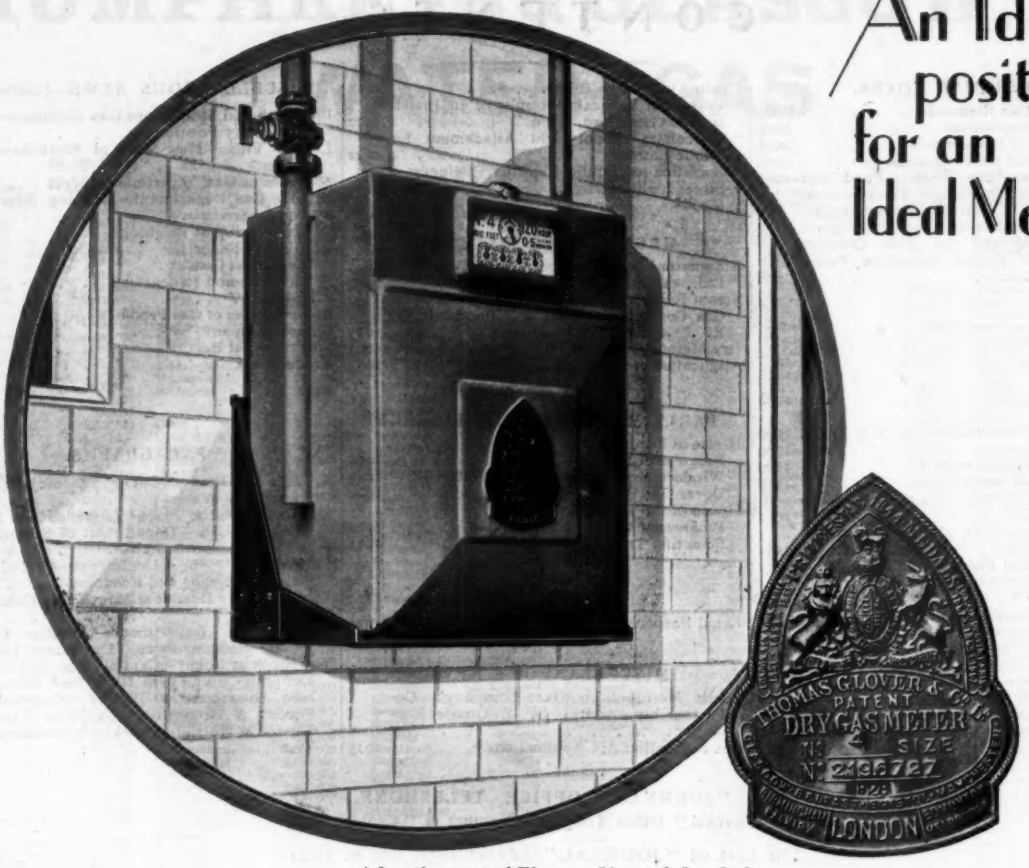

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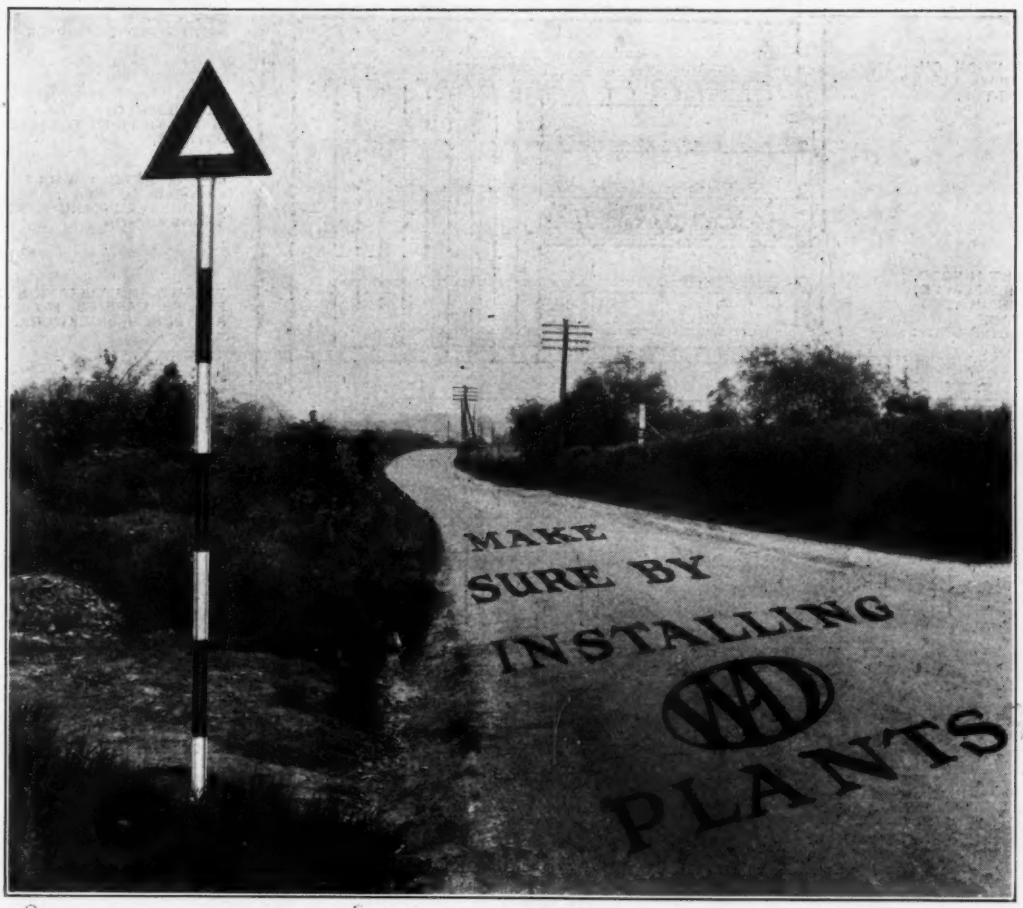

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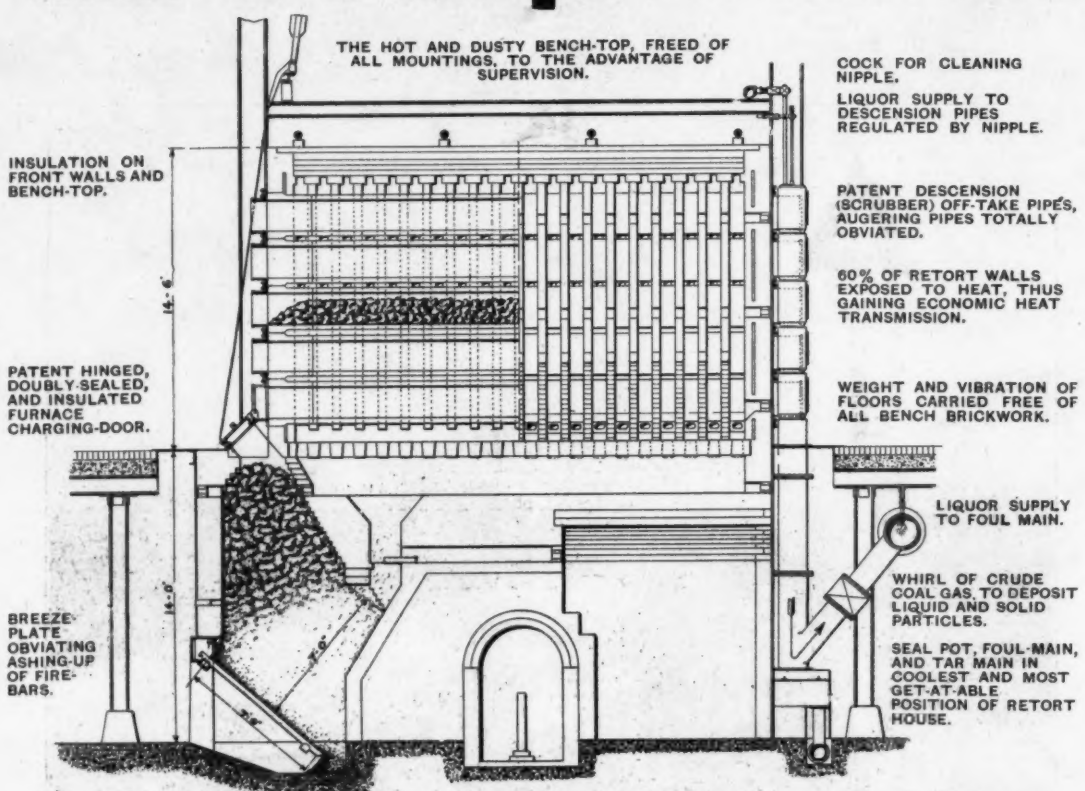
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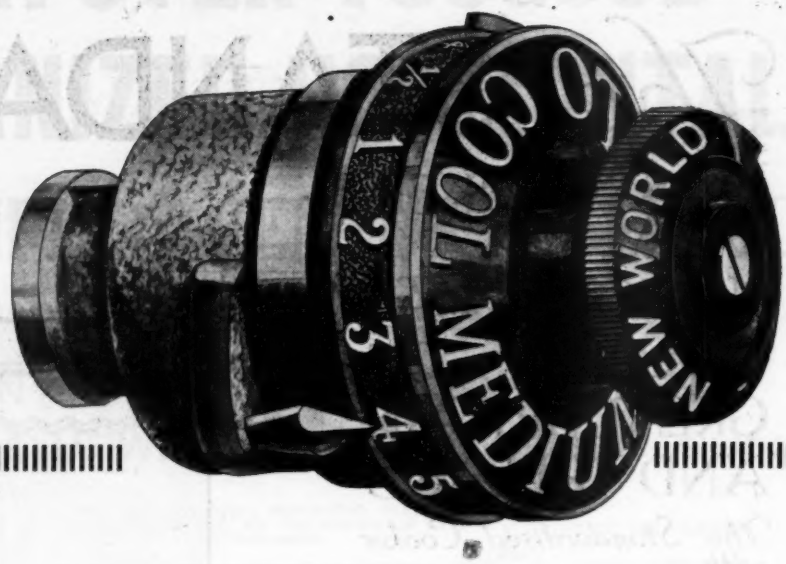

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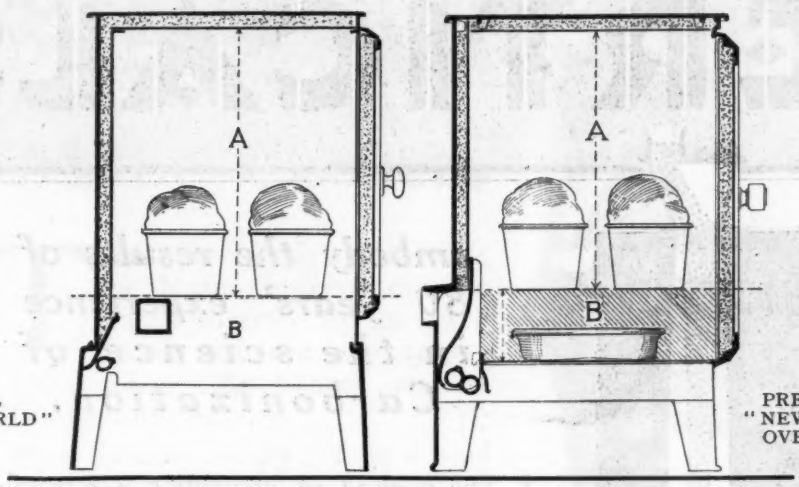

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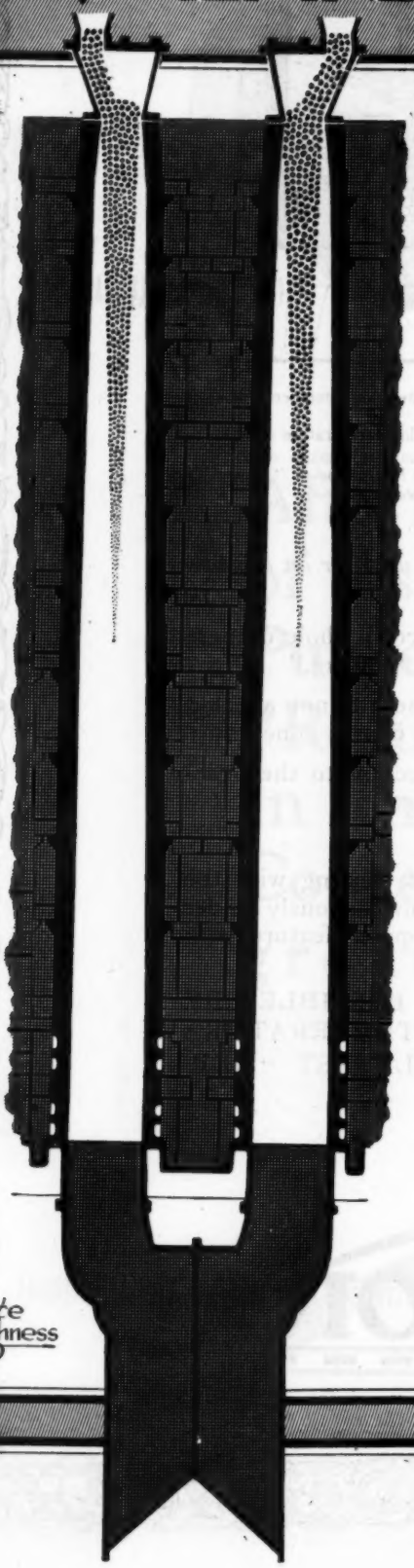

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THE London County Council will re- quire, in September next, Evening Visiting TEACHERS of GAS FITTING WORKSHOP PRACTICE, GAS FITTING (theory), and GAS SUPPLY, at the L.C.C. Westminster Technical Institute, Vincent Square, S.W. 1.
Applicants should possess the final grade certificate of the City and Guilds of London Institute, or equivalent qualifications, in Gas Fitting and/or Gas Supply. Teaching experience desirable.
Fee 16s. for Gas Fitting Workshop Practice, 22s. for other subjects, for each attendance of about 3 hours.
Preference will be given, other things being equal, to persons who served, or attempted to serve, with H.M. Forces.
Apply—Education Officer (T. 1a), The County Hall, Westminster Bridge, S.E. 1 (stamped addressed foolscap envelope necessary), for Form, to be returned by the 30th of June, 1928.
Canvassing disqualifies.
MONTAGU H. COX,
Clerk of the London County Council.

THE URBAN DISTRICT COUNCIL OF HOYLAKE AND WEST KIRBY.

(GAS DEPARTMENT.)

APPLICATIONS are invited for the Post of ASSISTANT SUPERINTENDENT of the Gas-Works, at a commencing wage of £4 per Week, rising, subject to approved service, by annual increments of 4s. per Week, to a maximum of £5 per Week.
Candidates must have a full technical and working knowledge of Vertical Retort Installation and be able to Take Full Charge in the absence of the Superintendent.
Applications, endorsed "Assistant Superintendent," stating Age, Qualifications, and Experience, accompanied by *copies* of Three recent Testimonials, must be delivered to the undersigned not later than Monday, the 2nd of July, 1928.
No application Forms are issued, and canvassing, directly or indirectly, will disqualify.
THOS. REDFERN,
Clerk to the Council.
Town Hall,
Hoylake,
June 19, 1928.

CONTRACTS OPEN.

SIDMOUTH URBAN DISTRICT COUNCIL.

(GAS AND ELECTRICITY WORKS.)

TENDERS are invited for the Supply of 3000 Tons of Yorkshire Screened GAS COAL during the period of Twelve Months.
Particulars and Form of Tender can be obtained from the undersigned.
Tenders to be received not later than 12 noon, July 12, 1928.
The Council do not bind themselves to accept the lowest or any Tender.
HY. BURGESS,
Engineer and Manager.
Sidmouth,
June, 1928.

ILKLEY URBAN DISTRICT COUNCIL.

(GAS DEPARTMENT.)

THE Gas Committee of the above Council invite TENDERS for the Supply and Erection of:

1.—Three Settings of Eight Through RETORTS 22 in. by 16 in. by 21 ft. 6 in. long, in three tiers, complete with Semi-Regenerator Furnaces and Fittings.
2.—The necessary arches for the above Beds, with 18 in. Pier Walls and 2 ft. 3 in. End Walls.
3.—The necessary BENCH BRACINGS, RETORT MOUNTINGS, HYDRAULIC, FOUL, and TAR MAINS, TAR TOWERS, and 6 in. ASCENSION PIPES at both sides.

Full Specification and Particulars may be had on application to the undersigned.
Tenders, endorsed "Retort Bench," and addressed to the Chairman of the Gas Committee, Gas-Works, Ilkley, to be delivered not later than 4 p.m. on Monday, July 2, 1928.
The Council do not bind themselves to accept the lowest or any Tender.
WM. EVERITT,
Engineer and Manager.
Gas-Works,
Ilkley,
June 23, 1928.

SUTTON-IN-ASHFIELD URBAN DISTRICT COUNCIL.

TENDERS FOR GAS COAL.

THE Gas Committee of the above Council invite TENDERS for the Supply of 8500 Tons of Well-Screened GAS COAL, to be free from Shale and Pyrites, to be delivered at the Council's Siding at the Great Northern Railway Station in such quantities as the Gas Manager shall from time to time direct, between the 1st of July, 1928, and the 30th of June, 1929.
Tenders, endorsed "Coal," to be sent to the undersigned not later than 10 a.m. on the 2nd day of July, 1928.
The Committee do not bind themselves to accept the lowest or any Tender.
LUTHER PEPPER,
Clerk to the Council.
Portland Square,
Sutton-in-Ashfield.

COMPANY NOTICES.

COMMERCIAL GAS COMPANY.

NOTICE is Hereby Given that the TRANSFER BOOKS of this Company, so far as they relate to ORDINARY CAPITAL, WILL BE CLOSED from the 5th of July to the 4th of August, both days inclusive.
By order of the Board,
F. J. BRADFIELD,
General Manager and Secretary.
Offices,
Stepney, E. 1,
June 25, 1928.

STOCK ISSUES.

By Order of the Directors.

THE RUGBY GAS COMPANY.

Messrs. A. & W. RICHARDS
are Instructed to OFFER FOR SALE BY TENDER
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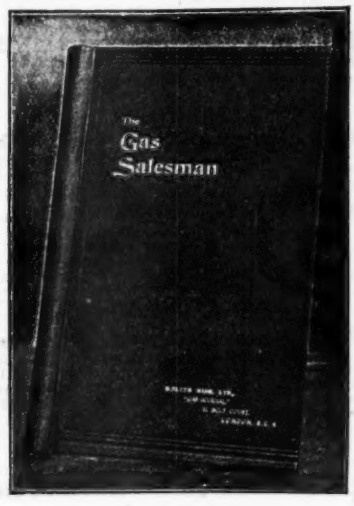

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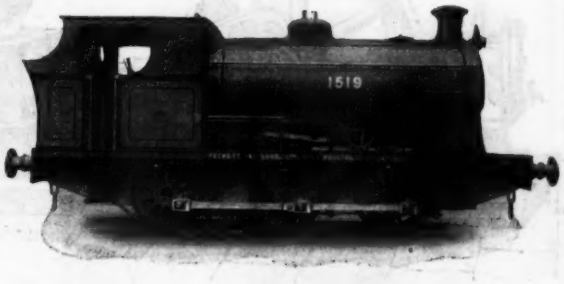

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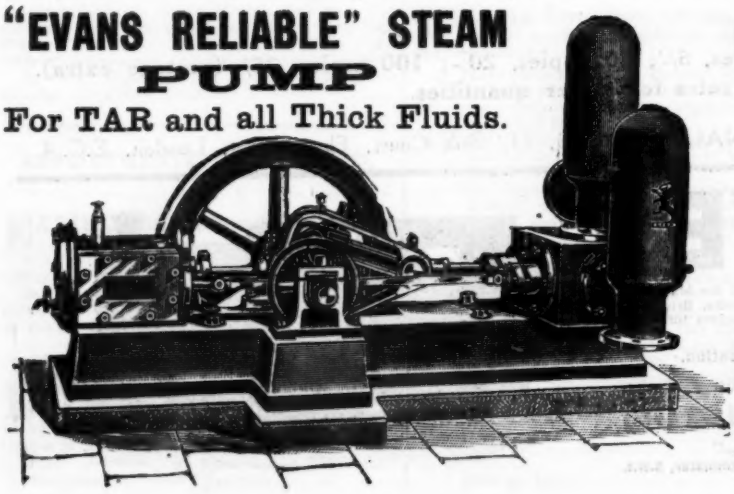

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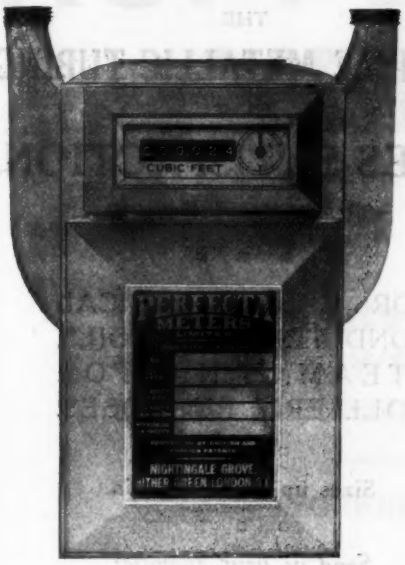

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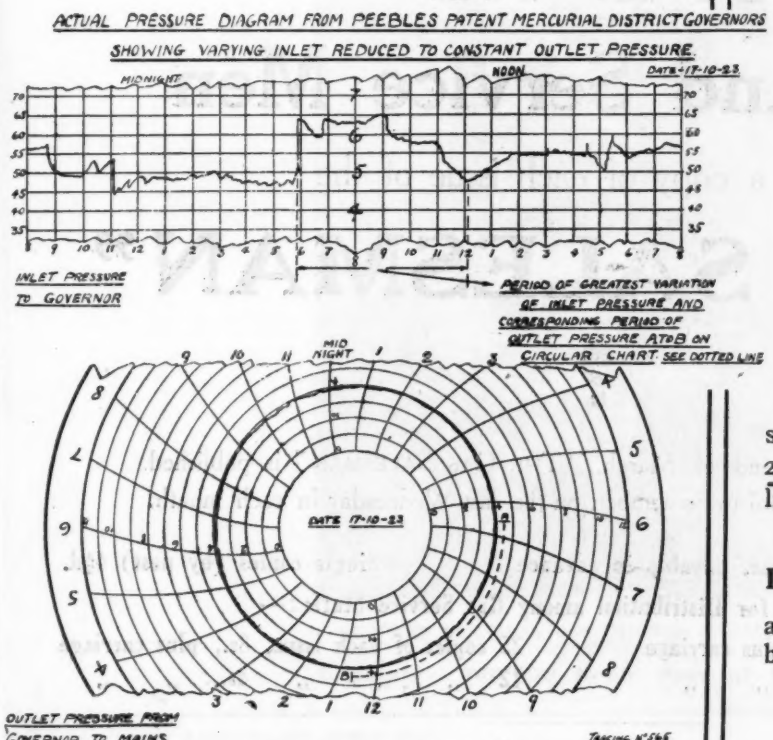
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NOON
DATE 17-10-23
INLET PRESSURE TO GOVERNOR
PERIOD OF GREATEST VARIATION OF INLET PRESSURE AND CORRESPONDING PERIOD OF OUTLET PRESSURE AT A & B ON CIRCULAR CHART SEE DOTTED LINE
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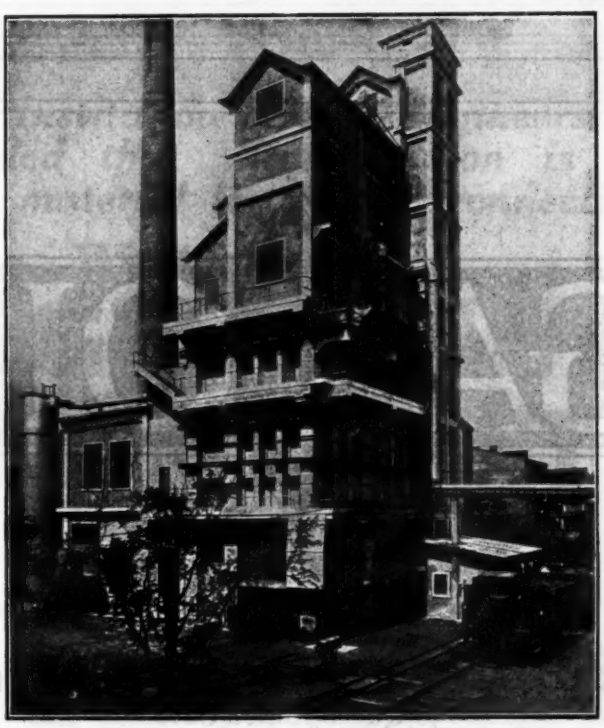

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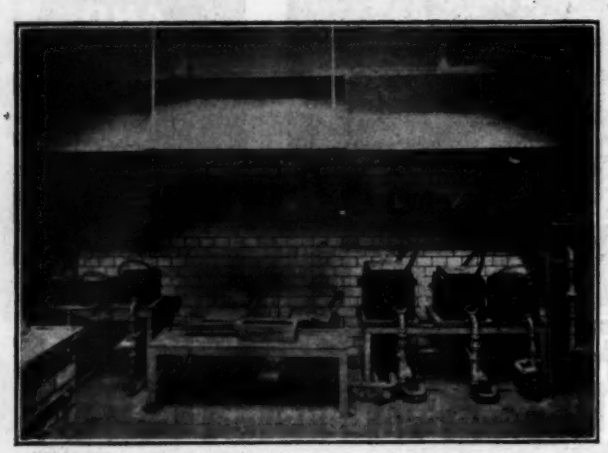

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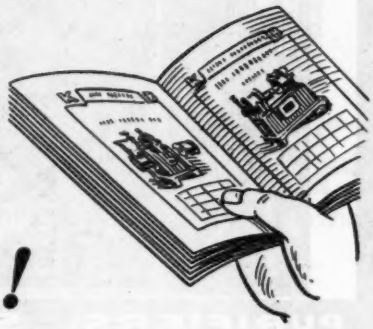

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